Multiaqua™

MULTIAQUA, Inc. 7th Anniversary QUALITY INDOOR AIR

Quality Indoor Air℠

Chilled Water Air Conditioning Systems

Chillers • Water & DX Fan Coils (Hide Away, High Wall and Universal Mount)

January 2006

Multiaqua™

About Us

Setting new industry standards is what we do best.

At Multiaqua, our commitment to creating innovative air conditioning products has made us one of the most respected organizations in the industry. From concept to market, Multiaqua takes a hands-on approach to ensure that each and every step meets our stringent standards of quality, durability and dependability.

All Multiaqua products are designed with the future in mind. That's why all air conditioning products are flexible, which makes it easy to adapt to virtually all kinds of building applications.

Whether it's residential or commercial air conditioning needs, Multiaqua has the product to meet or exceed all expectations.

Manufacturing Excellence

Our belief in quality is more than just a practice, it is something we take great pride in. Our quality management system is integrated with international quality requirements of ISO 9002. That is why some of the biggest OEM names in the air conditioning industry use Multiaqua products in their units. In fact, Multiaqua chillers were part of air conditioning systems that won first place awards in the Quality Home Comfort Awards Competition, which was created to honor the best in residential comfort system design and application.

Our products are tested and certified to the UL, CE, ARL, ETL, UL1995, and ARI standards: the most respected and stringent in the world.

Experience The Future

At Multiaqua, we invite you to come experience the future of air conditioning and see why more and more companies are discovering the new standard of air conditioning excellence. And by combining cost effectiveness, innovation and quality, Multiaqua will continue to provide air conditioning products that will be the most sought after in the world.

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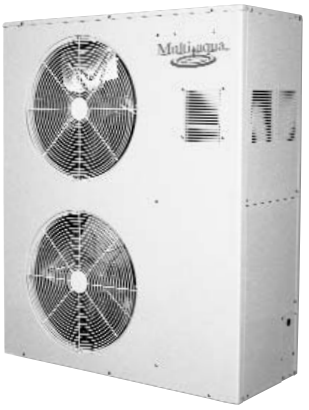
Water Product Overview



MAC - Air Cooled Chiller
MACH-Air Cooled Heat Pump Chiller

- **Self contained, air cooled R-22 chiller**
- **Copeland scroll compressor technology**
- **3,4, 5 and 10 ton units**
- **Horizontal air discharge**
- **Up to 12.23 EER**
- **Stainless Steel pump included**
- **Heat pump available in 5 ton only**
- **69 dbs sound level @ 5 feet**

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Page 7

MHCCW Chilled Water w/Electric Heat

Page 21

- 12,000 - 36,000 btu/h
- Hideaway design for clean installation
- Powder painted galvanized steel
- Field reversible Coil--Left or Right hand connections
- Heavy Gauge Metal Cabinet
- Dual manual air vents
- 42 - 48 dbs sound levels
- Electric heat

MHNCCW Chilled & Hot Water Fan Coil - 4 Pipe

Page 22

- 12,000 - 36,000 btu/h
- Hideaway design for clean installation
- Powder painted galvanized steel
- Double-field reversible Coil - Left or Right hand connections
- Heavy Gauge Metal Cabinet
- Dual manual air vents

Hi-Wall MHWW Water Fan Coil

Page 13

- 9,000 - 36,000 btu/h
- High wall mounting
- 42 - 48 dbs sound levels
- Attractive seamless appliance design
- Cleanable air filter included
- Infrared remote included
- Wired control option

MCCW Water Hideaway - 2 Pipe

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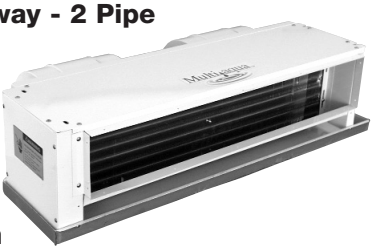

- 12,000 - 60,000 btu/h
- Hideaway design for clean installation
- 40 - 46 dbs sound levels
- Removes equipment from conditioned space
- Discharge may be split and ducted for small spaces

CFFZA & CFFW Universal Mount Water Fan Coil

Page 29

- 12,000 - 60,000 btu/h
- Floor, low wall or horizontal ceiling mount
- 42-48 dbs sound levels
- Attractive modular design
- Cleanable air filter included
- Factory supplied wired or wireless wall mounted remote control

CWA2-Chilled Water Air Handler with Electric Heat
DX Air Handler with Electric Heat

Page 37

- 18,000 - 60,000 btu/h
- Up flow, horizontal left or horizontal right
- Equipped with R 4.2 insulation
- 208 / 240 V / 1 phase/60 Hz
- Electric or hot water heat
- Electric heat

DX Product Overview

DX Fan Coils are compatible with R-22 Condensing Units

MHCCX DX Hideaway with Electric Heat

Page 26

- 12,000 - 60,000 btu/h
- Hideaway design for clean installation
- 40 - 46 dlbs sound levels
- Discharge may be split and ducted for small spaces
- Field Reversible DX coil
- Electric heat

CFFCA & FSFCA Universal Mount DX Fan Coil

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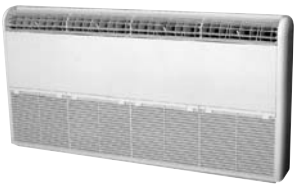


- 12,000 - 60,000 btu/h
- Floor, low wall or horizontal ceiling mount
- 42-48 dbs sound levels
- Attractive modular design
- Cleanable air filter included
- Factory supplied wired or wireless wall mounted remote control
- 13 Seer compatible DX Fan Coils equipped with thermal expansion valves

MHNCCX DX/Hot Water Hideaway Fan Coil

Page 27

- 12,000 - 60,000 btu/h
- Hideaway design for clean installation
- 40 - 46 dlbs sound levels
- Removes equipment from conditioned space
- Discharge may be split and ducted for small spaces
- Hot water heating coil
- Double field reversible coils - Left or Right hand connections

MCCX Water Hideaway - Cooling Only

Page 26

- 12,000 - 60,000 btu/h
- Hideaway design for clean installation
- 40 - 46 dbs sound levels
- Removes equipment from conditioned space
- Discharge may be split and ducted for small spaces

MHWX Hi-Wall DX Fan Coil

Page 16

- 9,000 - 36,000 btu/h
- High wall mounting
- 42 -48 dbs sound levels
- Attractive seamless appliance design
- Cleanable air filter included
- Infrared remote included
- Wired control option

Why buy a Multiaqua Chilled Water System?

Multiaqua Line of Chilled water Air Conditioners Score a Perfect "10"

	Chilled Water A/C Unit	Forced Air CX A/C Unit
1. Helps control the growth of mold, mildew and fungus	**1**	**0**
2. More energy efficient thru zoned comfort cooling	**1**	**0**
3. No refrigerant handling	1	0
4. No ductwork/Zero duct loss	1	0
5. Low installation costs	1	0
6. Can use gas household hot water for heat	1	0
7. No line length limitations	1	0
8. Easy to expand system, add capacity or add indoor units	1	0
9. Unlimited tonnage with Single Phase Power	1	0
10. Quiet and reliable	1	1
SCORE	10	1

Multiaqua™

MAC & MACH Air-Cooled Chillers

(Cooling only and heat Pump Models) Air-Cooled Chillers for Global Residential and Light Commercial MicroClimates

MAC Product Specifications

Model Number	Physical Data									
	Coil				Chiller				Weight	
	Height In [mm]	Length In [mm]	Copper Diameter In [mm]	No. Rows	Height In [mm]	Length In [mm]	Width In [mm]	R22 Oz. [G]	Net Lbs. [kg]	Shipping Lbs. [kg]
MAC-036	38 [965.2]	48 [1219.2]	3/8 [9.5]	1	49.75 [1263.65]	39.75 [1009.65]	16.25 [412.75]	88 [2494]	280 [127]	283 [128]
MAC-048	38 [965.2]	48 [1219.2]	3/8 [9.5]	2	49.75 [1263.65]	39.75 [1009.65]	16.25 [412.75]	96 [2736]	292 [132]	295 [134]
MAC-060	38 [965.2]	48 [1219.2]	3/8 [9.5]	2	49.75 [1263.65]	39.75 [1009.65]	16.25 [412.75]	96 [2736]	313 [142]	316 [143]
MAC-120-01	52.5 (133)	48 (122)	3/8 (9.5)	3	60 (152.5)	58.25 (148)	25.25 (64)	96 (2736)	650(295.5)	700(318)
MAC-120-02	52.5 (133)	48 (122)	3/8 (9.5)	3	60 (152.5)	58.25 (148)	25.25 (64)	96 (2736)	650(295.5)	700(318)
MAC-120-03	52.5 (133)	48 (122)	3/8 (9.5)	3	60 (152.5)	58.25 (148)	25.25 (64)	96 (2736)	650(295.5)	700(318)
MACH-060	38 [965.2]	48 [1219.2]	3/8 [9.5]	2	49.75 [1263.65]	39.75 [1009.65]	16.25 [412.75]	96 [2736]	323 [147]	326 [148]

Electrical Data

Model Number	Volts Phase Hertz	Per Compressor		Fan Motor x 2		Pump Motor Min. Circuit		Ampacity (Amperes) Per Circuit	Fuse or HACR Circuit Breaker Per Circuit	
		(RLA)	(LRA)	(FLA)	(RPM)	(FLA)	(RPM)		Min. Amps	Max. Amps
MAC-036-01	208/230-1-50/60	18.4	95	1.05	1050	3.7	3450	28.80	30	40
MAC-048-01	208/230-1-50/60	22.1	137	1.05	1050	3.7	3450	33.43	40	50
MAC-060-01	208/230-1-50/60	32.1	169	1.05	1050	3.7	3450	45.93	50	70
MAC-120-01	208/230-1-50/60	32.1	169	2.0	–	–	–	44.23	50	70
MAC-120-02	208/230-1-50/60	19.3	137	2.0	–	–	–	26.2	30	40
MAC-120-03	380/415/460-3-50/60	10	75	2.0	–	–	–	13.7	20	20
MAC-036-02	208/230-3-50/60	11.4	77	1.05	1050	3.7	3450	20.05	20	30
MAC-048-02	208/230-3-50/60	16.4	91	1.05	1050	3.7	3450	26.30	30	40
MAC-060-02	208/230-3-50/60	19.3	137	1.05	1050	3.7	3450	29.93	30	40
MACH-060-01	208/230-1-50/60	32.1	169	1.05	1050	3.7	3450	45.93	50	70
MAC-036-03	380/460-3-60	7.85	50	0.6	1050	2.85	3500	13.86	15	20
MAC-048-03	380/460-3-60	10	62	0.6	1050	2.85	3500	16.55	20	20
MAC-060-03	380/460-3-60	10	75	0.6	1050	2.85	3500	16.55	20	20

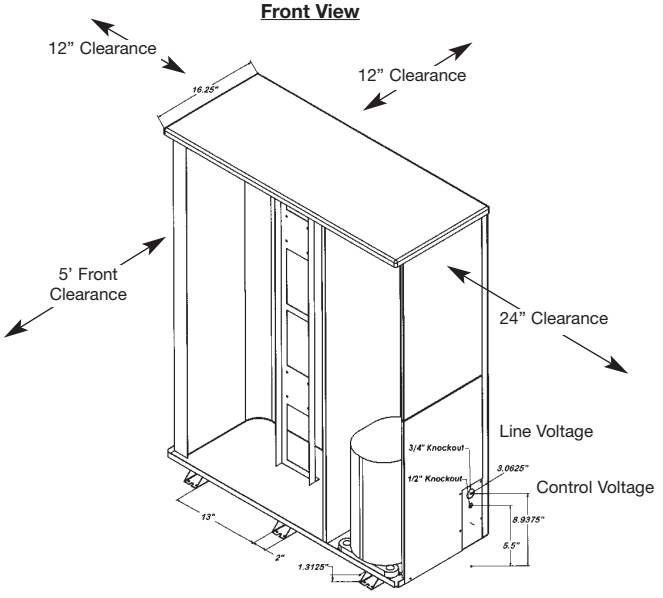
Supply Wire Length Feet	Copper Wire Size (1% Voltage Drop)								
200	6	4	4	4	3	3	2	2
150	8	6	6	4	4	4	3	3
100	10	8	8	6	6	6	4	4
50	14	12	10	10	8	8	6	6
	15	20	25	30	35	40	45	50
	Supply Circuit Ampacity								

Chiller Dimensions

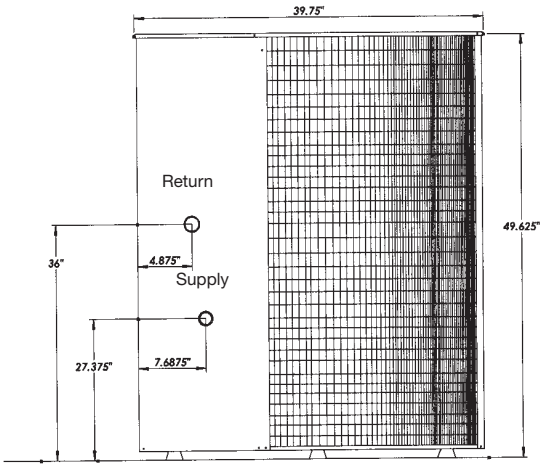
Clearance data relates to serviceability. Please check Local Building Department Regulations and Electrical Code Requirements.

MAC 036, 048, 060

Front View



Rear View

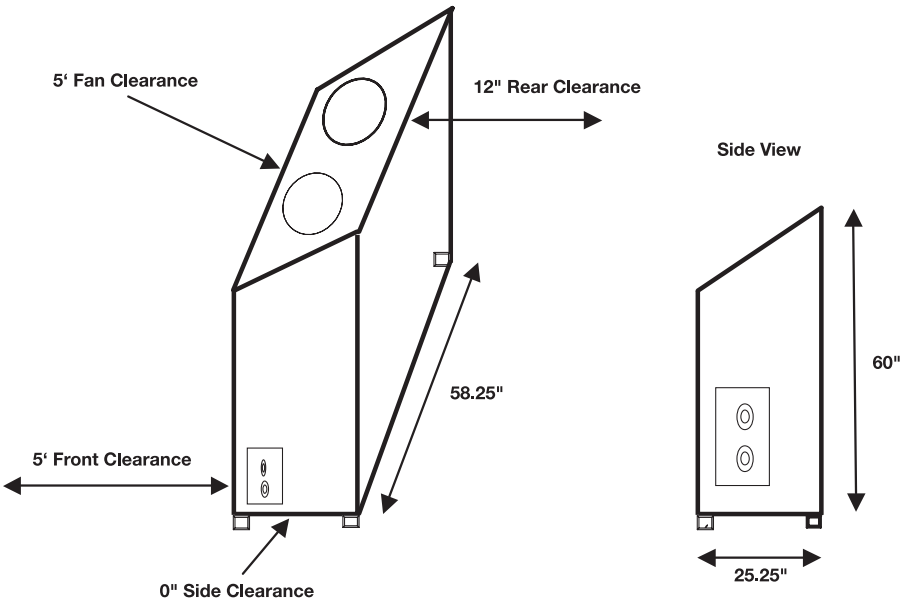


These Models are designed to operate exclusively with R-22 in a self-contained, pre-charged refrigerant system. Do not access the closed refrigerant system for any reason other than after-sale, after installation component replacement. Such service is to be conducted by qualified service personnel only.

These specifications are subject to change without notice.

MAC-120

Stated clearances for serviceability. Check local building department regulations and electrical code requirements.



	MAC-036-1	MAC-048-1	MAC-060-1	MAC-120	MACH 060-1
Compressor	Copeland Scroll K3	Copeland Scroll K3	Copeland Scroll K3	2 Copeland Scroll K3	Copeland Scroll K3
Heat Exchanger	Brazed Plate	Brazed Plate	Brazed Plate	Brazed Plate	Brazed Plate
Electrical Data	1-50/60-208/230 Volts	1-50/60-208/230 Volts	1-50/60-208/230 Volts	208/230/1/50/60 Volts	1-50/60-208/230 Volts
Max. Head Pressure	50 ft.	50 ft.	50 ft.	-	50 ft.
Max. Flow Rate	8.6 GPM	11.5 GPM	14.4 GPM	28.8 GPM	14.4 GPM
Min. Flow Rate	5.5 GPM1	6.5 GPM	9.0 GPM	18 GPM	9.0 GPM
Supply Water Temp.	44° F	44° F	44° F	45° F	44° F/130° F
Return Water Temp.	54° F	54° F	54° F	55° F	54° F/120° F
Min. System Water Content	25.0 Gals.	25.0 Gals.	25.0 Gals.	50 Gals.	25.0 Gals
Expansion Tank Size*	2.0 Gals.	2.0 Gals.	2.0 Gals.	3% of System Total	2.0 Gals
Pump	1/2 Hp Centrifugal Stainless Steel Pump Head Silicon Carbide/Viton Seals	1/2 Hp Centrifugal Stainless Steel Pump Head Silicon Carbide/Viton Seals	1/2 Hp Centrifugal Stainless Steel Pump Head Silicon Carbide/Viton Seals	Not Included	1/2 Hp Centrifugal Stainless Steel Pump Head Silicon Carbide/Viton Seals
Water Connections	1” Supply, 1¼” Return	1” Supply, 1¼” Return	1” Supply, 1¼” Return	1.5” Supply, 1.5” Return	Supply, 1¼” Return

* Field Installed

Capacity / Watts / EER*												
	MAC-036-1			MAC-048-1			MAC-060-1			MAC-120		
OD Temp. F	BTUH	Watts	EER	BTUH	Watts	EER	BTUH	Watts	EER	BTUH	Watts	EER
82	36433	3170	11.5	48577	4147	11.71	63381	5182	12.23	119,911	11,200	10.71
95	35062	3586	9.78	45210	4424	10.22	60712	5701	10.65	114,840	11,358	10.11
100	33763	3782	8.93	44248	4624	9.57	59658	5945	10.02	112,543	11,846	9.5
105	33186	3940	8.42	43286	4824	8.97	58653	6262	9.32	110,629	12,480	8.86
110	32429	4180	7.76	41844	5305	7.89	58607	6582	8.9	110,517	12,811	8.62

* Refrigerant system performance only, pump data not included.

The Multiaqua chiller is a self-contained air-cooled condenser, coupled with an insulated brazed plate heat exchanger (evaporator). The system utilizes a scroll compressor to circulate refrigerant between the condenser and heat exchanger. The refrigerant is metered into the heat exchanger with a thermostatic expansion valve. Protecting the system are high and low pressure switches, as well as a pump flow switch.

Liquid solution (water and propylene glycol) is circulated through the heat exchanger by a chiller-mounted pump (the pump liquid side is manufactured of stainless steel, with silicon carbide/Viton seals). The liquid solution flows through the heat exchanger to the system supply piping, and on to the air handlers.

* Low ambient kit - IC M 325H(+)ICM175
Added upon request

These specifications are subject to change without notice.

MAC Glycol Solution Data

The MAC Chiller must have a minimum of 10% Propylene Glycol mix for water treatment and freeze protection.

MAC Glycol Solution Data				
Propylene Glycol %	Water Flow	Capacity	Min. Ambient Temperature	GPM Adjustment = 100% Capacity
10%	x 1.020	x 0.99	26° F	x 1.01
20%	x 1.028	x 0.98	18° F	x 1.03
30%	x 1.036	x 0.98	8° F	x 1.07
40%	x 1.048	x 0.97	-7° F	x 1.11
50%	x 1.057	x 0.96	-29° F	x 1.16

Example: 30% glycol solution in MAC060-1
Maximum Flow Rate 12GPM x 1.036
System Capacity x 0.96
Use Propylene Glycol

Important

If the outside temperature is expected to fall below freezing (32F) in the area the MAC is to be installed; the installer must take the following precautions. Failure to do so will void the warranty.

To not engage in cold ambient mitigation will result in the failure of components such as the heat exchanger, piping, pump, etc., and property damage.

- Keep the system pump in a constant energized mode to keep constant circulation of fluid
- Use a propylene glycol/water mix. The percentage amount of glycol recommended is dependent on the expected ambient temperatures and the solution makeup recommendation of the glycol manufacturer. Refer to Glycol Solution Data Chart.
- A minimum of 10% Glycol is to be used at all times. Even in areas where there is no danger of freezing.

These specifications are subject to change without notice.

Warranty: ***One Year Parts, 5 Year Compressor, 5 Year Heat Exchanger, for North American installations only. See Warranty Statement included with each Chiller for Specifics and Exclusions.***

Please Note:
For low ambient kit installed - Please add the suffix (L) after each MAC (Chiller part number).

Guide Specifications

Air-Cooled Liquid Chiller
HVAC Guide Specifications
Size Range: 3, 4, 5 & 10 Tons

Multiaqua Model Number: MAC036, MAC048, MAC060, MAC120

Part 1- General
1.01 SYSTEM DESCRIPTION
Air-cooled liquid chiller utilizing scroll compressor, low sound fans, MAC036, MAC048, MAC060 include a hydronic pump system.

1.02 QUALITY ASSURANCE
A. Unit shall be certified in accordance with U.L. Standard 95, latest revision (U.S.A.).
B. Unit construction shall comply with ASHRAE 15 Safety Code, NEC, and ASME applicable codes (U.S.A. codes).
C. Unit shall be manufactured in a facility registered to ISO 9002, Manufacturing Quality Standard.
D. Unit shall be full load run tested at the factory.

1.03 DELIVERY, STORAGE, AND HANDLING
A. Unit controls shall be capable of withstanding 150 F storage temperatures in the control compartment.
B. Unit shall be stored and handled per unit manufacturer's recommendations.

Part 2- Products
2.01 EQUIPMENT
A. General:
Factory assembled, air-cooled liquid chiller. Contained within the unit cabinet shall be all factory wiring, piping controls, refrigerant charge (R-22), and special accessories required prior to field start-up.
B. Unit Cabinet:
1. Cabinet shall be galvanized steel casing with a baked polyester powder.
2. Cabinet shall be capable of withstanding 500-hour salt spray test in accordance with the ASTM (U.S.A.) standard.

C. Fans:
1. Condenser fans shall be direct-driven, 4-blade, aluminum construction, and shall be statically and dynamically balanced with inherent corrosion resistance.
2. Air shall be discharged horizontally.
3. Fans shall be protected by coated steel wire safety guards.

D. Compressors:
1. Fully hermetic scroll type compressors.
2. Direct Drive, 3500 rpm (60Hz) protected by either line break device or discharge gas thermostat, depending on motor, suction gas cooled motor.
3. External vibration isolation- rubber in sheat.

E. Cooler:
1. Cooler shall be rated for a refrigerant working-side pressure of 450 psig and shall be tested for a maximum fluid-side pressure of 150 psig.
2. Shall be single-pass, ANSI type 316 stainless steel, brazed plate construction.
3. Shell on MAC036, MAC048 & MAC060 shall be insulated with _" closed cell, elastomeric foam (ASTM518).
4. Shall incorporate one independent refrigerant circuit.

F. Condenser:
1. Coil shall be air-cooled with integral subcooler, and shall be constructed of aluminum fins mechanically bonded to welded copper tubes.
2. Tubes shall be cleaned, dehydrated, and sealed.
3. Assembled condenser coils shall be leak tested and pressure tested at 450 psig (3103 kPa).

G. Refrigeration Components:
Refrigerant circuit components shall include moisture indicating sight glass, thermal expansion device, and complete operating charge of both refrigerant R-22 and compressor oil.

H. Controls and Safeties:
1. Controls:
a. Unit controls shall include the following minimum components:
b. Control transformer to serve all controllers, relays, and control components.
c. Pump bypass timer.
d. Compressor recycle timer.
e. Optional low pressure bypass timer for low ambient operation.
f. Optional fan cycling control for low ambient operation.
g. Flow switch.

h. Leaving water temperature thermostat with thermistor installed to measure cooler leaving fluid temperatures.

2. Unit controls shall include the following functions.
   a. Capacity control based on leaving chilled fluid temperature. Temperature set point accuracy + - 1.0 F.
   b. Chilled water pump start/stop control.
3. Safeties:
   a. Unit shall be equipped with thermistors and all necessary components in conjunction with the control system to provide the unit with the following protectants:

1) Low refrigerant pressure.
2) Low chilled fluid temperature.
3) Thermal overload.
4) High refrigerant pressure.

b. Condenser fan and factory pump motors shall have internal thermal protection.

I. Operating Characteristics:

1. Unit shall be capable of starting and running at outdoor ambient temperatures from 0 F to 120 F with optional Low Ambient Kit.
2. Unit shall be capable of starting up with 95 F (35 C) entering fluid temperature to the cooler.

J. Motors:

Condenser fan motors shall be totally enclosed single speed, with permanently lubricated sleeve bearings and Class F insulation.

K. Electrical Requirements:

1. Unit primary electrical power supply shall enter the unit at a single location.
2. Primary electrical power supply shall be rated to withstand 120 F (50 C) operating ambient.
3. Unit shall operate on 1-phase or 3-phase power at the voltage shown in the equipment schedule.
4. Control points shall be accessed through terminal block.
5. Unit shall be shipped with factory control and power wiring installed.

L. Hydronic System:

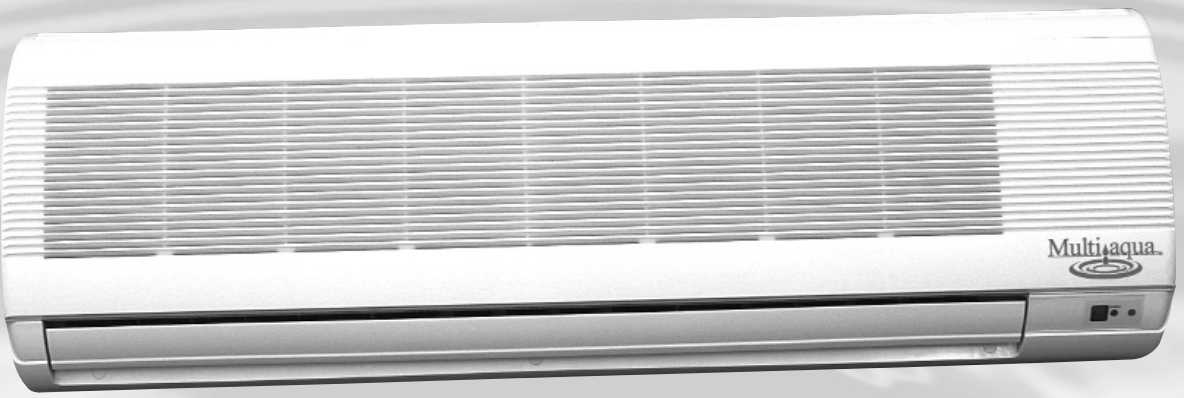
1. Field pipe connections shall be brass NPT and shall be extended to the outside of the unit chassis.
2. Pumps shall be single stage design, for installation in horizontal position and capable of being serviced without disturbing piping connections.
   a. Pump casing shall be of stainless steel.
   b. The impeller shall be of stainless steel type, dynamically balanced and screwed onto the shaft.
   c. The liquid cavity shall be sealed off at the motor shaft by an internally flushed mechanical seal with silicon carbide face and viton seal ring.

   d. Pump shall be rated for 80 psig working pressure.
   e. The pump case shall have drain ports.
   f. Motors shall be totally enclosed 1-phase type with permanentely lubricated sleeve bearings. Each pump shall be factory tested per Hydraulic Institute Standards.
   g. Please note that 1/2 HP pump is included only on our 3, 4 and 5 ton models. 10 ton model does not included pump.
3. Brass body strainer with 20 mesh screen and blow down supplied in cabinet as field installable accessory.

M. Special Features:

1. Low-Ambient Operation:
   a. Unit shall be capable of starting and running at outdoor ambient temperatures down to –20 F (-29 C) with the addition of antifreeze in the cooler circuit and field or factory-installed low ambient kit.

Multi aqua™



Hi-Wall MHWW Chilled Water Fan Coil

with Wireless Remote Control

Wired Remote Control Option

MHWW Hi-Wall Chilled Water Fan Coil							
MODEL			MHWW-09	MHWW-12	MHWW-18	MHWW-24	MHWW-36
Description			9000 BTUH 208/230V-1-50/60	12000 BTUH 208/230V-1-50/60	18000 BTUH 208/230V-1-50/60	24000 BTUH 208/230V-1-50/60	36000 BTUH 208/230V-1-50/60
Nominal Cooling Capacity		BTU/H	8,057	11,331	17,023	23,709	35,900
Power Supply		V/V/P/Hz	208/230/1/50/60	208/230/1/50/60	208/230/1/50/60	208/230/1/50/60	208/230/1/50/60
Air Circulation		CFM [1]	270	330	480	600	850
Automatic Air Swing			Step Motor				
Fin Material			Chemical Coated				
Fan Speed			3	3	3	3	3
Electronic Controller			LCD Wireless Remote				
Running Current		AMPERE	0.14	0.16	0.23	0.33	0.4
KITEC	Water In	Inch	0.5	0.5	0.5	0.5	0.75
Connections	Water Out	Inch	0.5	0.5	0.5	0.5	0.75
	Height	Inch	11.7	12.0	14.17	14.17	14.25
Dimmensions	Width	Inch	34.65	34.65	46.14	46.14	56.5
	Depth	Inch	6.7	7.1	8.1	8.1	8.37
Drain Connections		Inch	0.5	0.5	0.5	0.5	0.75
Net Weight		Lbs	20.2	22.0	35.6	37.4	50.0
Gross Weight		Lbs	25.7	27.5	44.4	46.2	50.5
Pressure Drop		feet of H°O	2.8	7.7	9.1	10.4	12.7
Flow Rate		GPM	1.8	3.0	3.6	4.8	7.2

[1] Capacity listed at 44°F L.W.T., 55°F E.W.T.

MHWW Heating Capacities High Wall Water

MHWW-09 Htg. Capacity @ 1.8 GPM				
EAT	100 EWT	110 EWT	120 EWT	130 EWT
50	10542	12690	14847	17012
60	8446	10587	12738	14897
70	6346	8481	10626	12779
80	4243	6371	8511	10660

MHWW-12 Htg. Capacity @ 2.4 GPM				
EAT	100 EWT	110 EWT	120 EWT	130 EWT
50	12933	15561	18198	20844
60	10358	12978	15610	18249
70	7780	10393	13018	15652
80	5199	7806	10425	13053

MHWW-18 Htg. Capacity @ 3.6 GPM				
EAT	100 EWT	110 EWT	120 EWT	130 EWT
50	19495	23445	27408	31381
60	15617	19557	23511	27477
70	11735	15665	19611	23569
80	7848	11770	15708	19659

MHWW-24 Htg. Capacity @ 4.8 GPM				
EAT	100 EWT	110 EWT	120 EWT	130 EWT
50	26686	32086	37499	42924
60	21367	26756	32159	37576
70	16043	21421	26816	32224
80	10715	16083	21468	26868

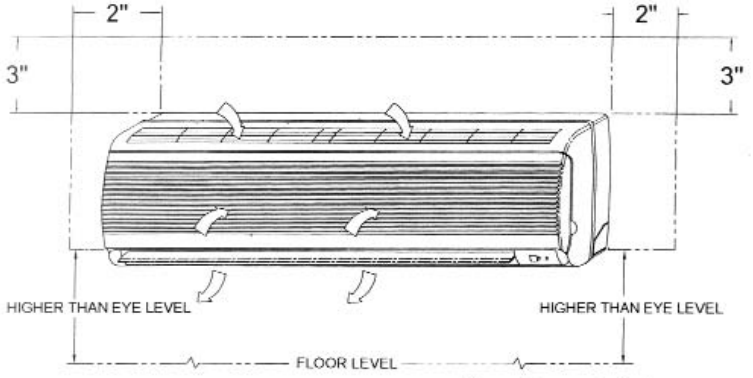
MHWW-36 Htg. Capacity @ 7.2 GPM				
EAT	100 EWT	110 EWT	120 EWT	130 EWT
50	38482	46254	54043	61845
60	30806	38565	46341	54133
70	23125	30871	38636	46418
80	15438	23172	30927	38699

Mounting Instructions Hi-Wall Water Fan Coil

Select the location of the indoor unit with the following consideration:

1. The front of the air inlet and outlet shall be free from any obstruction. The outlet air should flow out freely.
2. The wall where the unit is to be mounted should be stiff enough not to resonate and produce noise.
3. Ensure the clearance on every side of the indoor unit to conform to figure 1.
4. From floor, the height should e more than eye level.

Caution: Avoid installing the unit in direct sunlight.



Maintenance & Servicing Space

Air Flow Direction

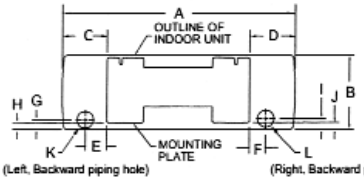
Dimensions are in inches.

FIGURE.1

Mounting Plate Installation

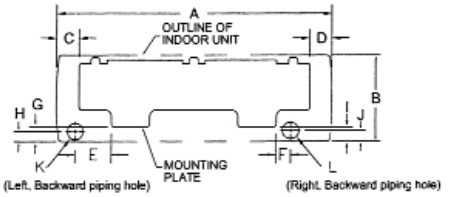
1. After a suitable place for installation has been selected, place the mounting plate horizontally on the wall. Make sure the alignment is horizontal. Use a plumb line, if available.
2. Referring to the figure below, mark the location for the wall plugs and the hole for the pipings.

Plan dimension for mounting plate installation



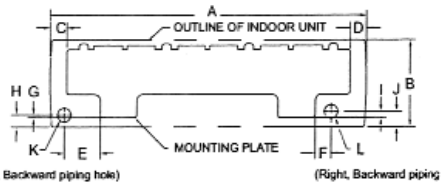
MODEL	A	B	C	D	E	F	G	H	I	J	K	L
MHWW-09-H1	34.6	11.7	7.5	7.5	3.5	2.7	1.6	0.8	1.8	0.8	ϕ 2.76	ϕ 2.76
MHWW-12-H1	39.0	12.0	7.5	7.5	3.6	2.7	1.5	1.1	1.7	1.0	ϕ 2.76	ϕ 2.76

Dimensions are in inches.



MODEL	A	B	C	D	E	F	G	H	I	J	K	L
MHWW-18-H1	46.0	14.2	3.8	3.8	6.1	2.4	2.4	1.7	2.4	1.8	ϕ 2.76	ϕ 2.76
MHWW-24-H1												

Dimensions are in inches.



MODEL	A	B	C	D	E	F	G	H	I	J	K	L
MHWW-36-H1	57.1	14.4	4.0	4.0	6.1	2.8	1.5	1.7	1.5	1.8	ϕ 2.76	ϕ 2.76

Dimensions are in inches.

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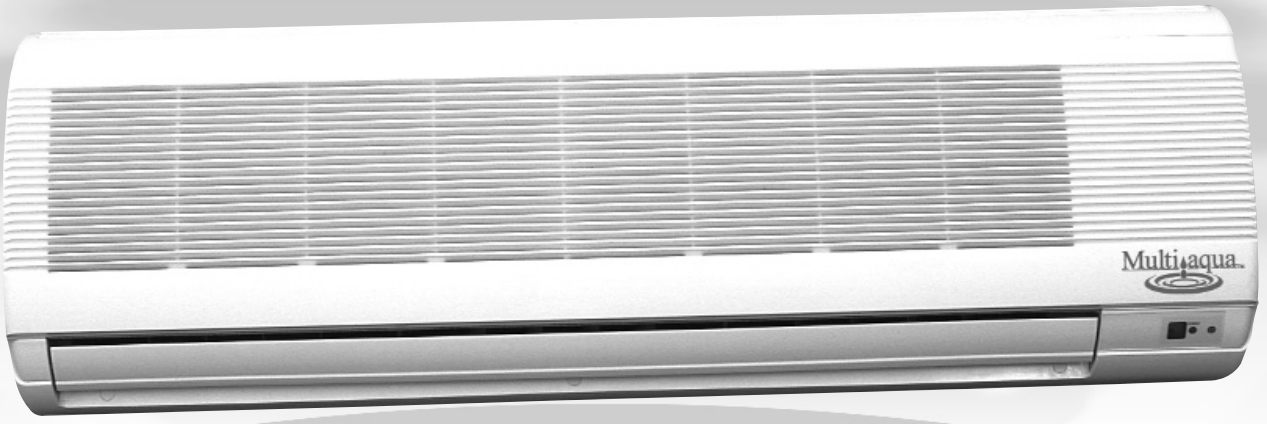


Hi-Wall MHWX
DX FAN COIL
With Wired Remote Control Option

MHWX Dx Fan Coil Specifications					
Model	MHWX-09	MHWX-12	MHWX-18	MHWX-24	MHWX-36
Description	9000 BTUH 208/230V-1-50/60	12000 BTUH 208/230V-1-50/60	18000 BTUH 208/230V-1-50/60	24000 BTUH 208/230V-1-50/60	36000 BTUH 208/230V-1-50/60
Cooling Capacity (BTUH) Nominal	9,000	12,000	18,000	24,000	36,000
Airflow (CFM) @ High-Speed	270	330	480	600	850
Motor HP - Qty.	1/50-1	1/50-1	1/20-1	1/20-1	1/12-1
Supply Voltage	1 Phase - 50/60 Hz - 208/230 VAC				
Motor Power Consumption (Watts)	16	16	35	35	60
Blower Size - Qty.	3.9”x27.4”- 1	3.8”x31.7”-1	4.0”x35.4”-1	4.1”x35.4”-1	4.2”x22.6”-2
Coil Type	Hydrophilic Plate Fin, Plain Tube			Hydrophilic Plate Fin, Grooved Tube	
No. of Rows - FPI	2 - 20	2 - 14	2 - 16	3 - 17	3 - 18
Coil Face Area ($Ft.^2$)	1.67	1.94	2.46	2.46	3.54
Liquid Line - Flare (Inches)	1/4	1/4	5/16	3/8	3/8
Suction Line - Flare (Inches)	3/8	3/8	1/2	5/8	5/8
Drain Connection (Inches)	1/2	1/2	3/4	3/4	3/4
Dimensions (Inches) Width	34.6	39.0	46.1	46.1	57.1
Height	11.7	12.0	14.2	14.2	14.4
Depth	7.1	7.1	8.1	8.1	8.5
Approx. Weight in Lb.’s	20.0	22.0	35.6	37.4	54.0
Sound Data (db)	34/38/42	34/38/42	40/42/45	40/42/45	38/44/48
Air Filter	Washable				
Fan Speed	3 Speed plus Auto Fan Function				

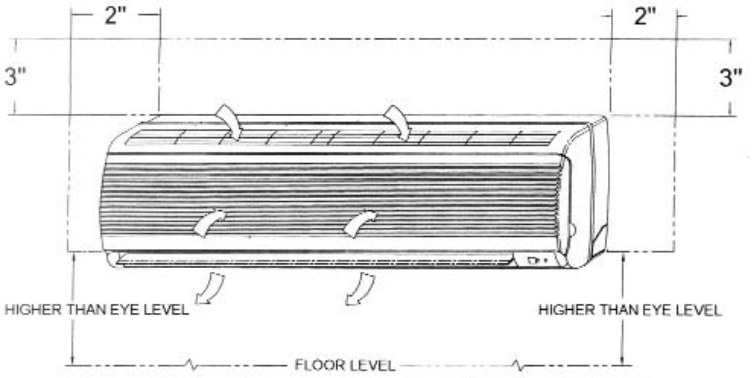
* Please add (-13) for 13 Seer equipment.
* Cooling based on 75% Sensible, 25% Latent, 80°D.B./67°W.B.

Mounting Instructions Hi-Wall DX Fan Coil

Select the location of the indoor unit with the following consideration:

1. The front of the air inlet and outlet shall be free from any obstruction. The outlet air should flow out freely.
2. The wall where the unit is to be mounted should be stiff enough not to resonate and produce noise.
3. Ensure the clearance on every side of the indoor unit to conform to figure 1.
4. From floor, the height should e more than eye level.

Caution: Avoid installing the unit from direct sunlight.



Maintenance & Servicing Space

Air Flow Direction

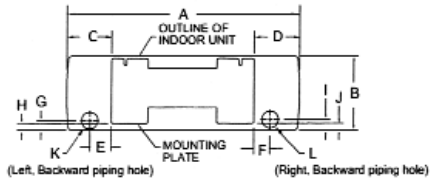
Dimensions are in inches.

FIGURE.1

Mounting Plate Installation

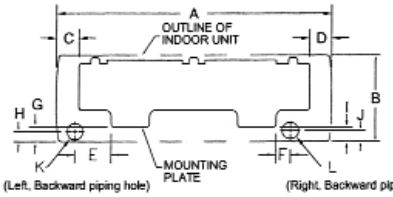
1. After a suitable place for installation has been selected, place the mounting plate horizontally on the wall. Make sure the alignment is horizontal. Use a plumb line, if available.
2. Referring to the figure below, mark the location for the wall plugs and the hole for the pipings.

Plan dimension for mounting plate installation



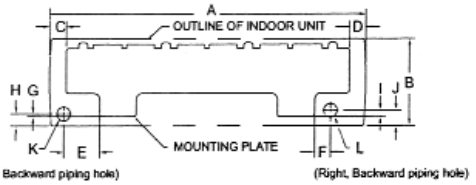
MODEL	A	B	C	D	E	F	G	H	I	J	K	L
MHWX-09-C1	34.6	11.7	7.5	7.5	3.5	2.7	1.6	0.8	1.8	0.8	ϕ 2.76	ϕ 2.76
MHWX-12-C1	39.0	12.0	7.5	7.5	3.6	2.7	1.5	1.1	1.7	1.0	ϕ 2.76	ϕ 2.76

Dimensions are in inches.



MODEL	A	B	C	D	E	F	G	H	I	J	K	L
MHWX-18-C1	46.0	14.2	3.8	3.8	6.1	2.4	2.4	1.7	2.4	1.8	ϕ 2.76	ϕ 2.76
MHWX-24-C1												

Dimensions are in inches.



MODEL	A	B	C	D	E	F	G	H	I	J	K	L
MHWX-36-C1	57.1	14.4	4.0	4.0	6.1	2.8	1.5	1.7	1.5	1.8	ϕ 2.76	ϕ 2.76

Dimensions are in inches.

Hideaway Fan Coil Section

*** Please note that all Hideaway Fan Coils come equipped with a 24V Transformer & Relay**

Multi aqua™

Hideaway/Ceiling Concealed Water Fan Coils

II. MHCCW Series-Water Fan Coil Specifications
1 through 3 Tons with 4 & 5 Ton soon to be available

Performance Data			Hydronic	Cooling	w/Wlectric	heat																	
Model #	Nominal Cooling Cap–(BTUH)	Nominal Airflow (CFM)	Heat KW	Heat BTUH	Total Amps	Min. Cir. Ampacity	Motor HP Qty	Supply Voltage	Motor C	Blower Size–Qty	Coil Type	Rows FPI	Coil Face (Ft Sq)	Water In	Water Out	Drain Conn.	Dimensions (inches) Width	Depth	Height	Weight Lbs.	Pressure Drop	Flow Rate-GPM
MHCCW04-00	12,000	400	0	-	0.82	1.00	1/8x1	208/230-50/60	170	GI 6x7-2	Al Fin, Cu Tube	2- 14	1.67	5/8	5/8	3/4	37.72	21.65	10	66.00	3	2.4
-03	12,000	400	3	10,200	13.86	19.31	1/8x1	208/230-50/60	170	GI 6x7-2		2- 14	1.67	5/8	5/8	3/4	37.72	21.65	10	66.00	3	2.4
-05	12,000	400	5	17,000	22.56	31.60	1/8x1	208/230-50/60	170	GI 6x7-2		2- 14	1.67	5/8	5/8	3/4	37.72	21.65	10	66.00	3	2.4
-06	12,000	400	6	20,500	26.90	37.60	1/8x1	208/230-50/60	170	GI 6x7-2		2- 14	1.67	5/8	5/8	3/4	37.72	21.65	10	66.00	3	2.4
-08	12,000	400	8	27,300	35.60	48.30	1/8x1	208/230-50/60	170	GI 6x7-2		2- 14	1.67	5/8	5/8	3/4	37.72	21.65	10	66.00	3	2.4
MHCCW06-00	18,000	600	0	-	1.18	1.48	1/8x1	208/230-50/60	275	GI 6x7-2		3- 14	1.67	5/8	5/8	3/4	37.72	21.65	10	68.20	3	3.6
-03	18,000	600	3	10,200	14.22	19.76	1/8x1	208/230-50/60	275	GI 6x7-2		3- 14	1.67	5/8	5/8	3/4	37.72	21.65	10	68.20	3	3.6
-05	18,000	600	5	17,000	22.92	32.05	1/8x1	208/230-50/60	275	GI 6x7-2		3- 14	1.67	5/8	5/8	3/4	37.72	21.65	10	68.20	3	3.6
-06	18,000	600	6	20,500	27.27	38.05	1/8x1	208/230-50/60	275	GI 6x7-2		3- 14	1.67	5/8	5/8	3/4	37.72	21.65	10	68.20	3	3.6
-08	18,000	600	8	27,300	35.96	48.75	1/8x1	208/230-50/60	275	GI 6x7-2		3- 14	1.67	5/8	5/8	3/4	37.72	21.65	10	68.20	3	3.6
MHCCW08-00	24,000	800	0	-	1.43	1.80	1/4x1	208/230-50/60	325	GI 6x7-2		4 -14	1.67	5/8	5/8	3/4	37.72	21.65	10	72.60	5	4.8
-03	24,000	800	3	10,200	14.47	20.08	1/4x1	208/230-50/60	325	GI 6x7-2		4- 14	1.67	5/8	5/8	3/4	37.72	21.65	10	72.60	5	4.8
-05	24,000	800	5	17,000	23.17	32.36	1/4x1	208/230-50/60	325	GI 6x7-2		4- 14	1.67	5/8	5/8	3/4	37.72	21.65	10	72.60	5	4.8
-06	24,000	800	6	20,500	27.52	38.36	1/4x1	208/230-50/60	325	GI 6x7-2		4- 14	1.67	5/8	5/8	3/4	37.72	21.65	10	72.60	5	4.8
-08	24,000	800	8	27,300	36.21	49.06	1/4x1	208/230-50/60	325	GI 6x7-2		4- 14	1.67	5/8	5/8	3/4	37.72	21.65	10	72.60	5	4.8
MHCCW10-00	30,000	1000	0	-	1.43	1.80	1/4x1	208/230-50/60	325	AL 6x8-2		4- 14	1.67	5/8	5/8	3/4	37.72	21.65	10	74.80	23	6.0
-03	30,000	1000	3	10,200	14.47	20.08	1/4x1	208/230-50/60	325	AL 6x8-2		4 -14	2.00	7/8	7/8	3/4	43.7	21.65	10	74.80	23	6.0
-05	30,000	1000	5	17,000	23.17	32.36	1/4x1	208/230-50/60	325	AL 6x8-2		4 -14	2.00	7/8	7/8	3/4	43.7	21.65	10	74.80	23	6.0
-06	30,000	1000	6	20,500	27.52	38.36	1/4x1	208/230-50/60	325	AL 6x8-2		4- 14	2.00	7/8	7/8	3/4	43.7	21.65	10	74.80	23	6.0
-08	30,000	1000	8	27,300	36.21	49.06	1/4x1	208/230-50/60	325	AL 6x8-2		4- 14	2.00	7/8	7/8	3/4	43.7	21.65	10	74.80	23	6.0
MHCCW12-00	36,000	1200	0	-	1.81	2.26	1/4x1	208/230-50/60	420	AL 6x9-2		4 -14	2.33	7/8	7/8	3/4	49.68	21.65	10	83.60	24	7.2
-03	36,000	1200	3	10,200	14.85	20.55	1/4x1	208/230-50/60	420	AL 6x9-2		4- 14	2.33	7/8	7/8	3/4	49.68	21.65	10	83.60	24	7.2
-05	36,000	1200	5	17,000	23.55	32.84	1/4x1	208/230-50/60	420	AL 6x9-2		4 -14	2.33	7/8	7/8	3/4	49.68	21.65	10	83.60	24	7.2
-06	36,000	1200	6	20,500	27.90	38.84	1/4x1	208/230-50/60	420	AL 6x9-2		4- 14	2.33	7/8	7/8	3/4	49.68	21.65	10	83.60	24	7.2
-08	36,000	1200	8	27,300	36.60	49.54	1/4x1	208/230-50/60	420	AL 6x9-2		4- 14	2.33	7/8	7/8	3/4	49.68	21.65	10	83.60	24	7.2

III. DX /Water Hideaway Fan Coils with Electric Heat
CFM vs. External Static Pressure Tables

Series	Description	CFM vs. External Static Pressure Tables					
Water	Water	0.00	0.05	0.10	0.15	0.20	0.25	0.30
MHCCW04	1 Ton	485	455	415	370	325	0	0
MHCCW06	1 1/2Ton	775	745	715	680	640	595	545
MHCCW08	2 Ton	915	890	850	815	775	730	685
MHCCW10	2 1/2Ton	1145	1110	1075	1035	995	955	905
MHCCW12	3 Ton	1480	1445	1405	1365	1325	1280	1235

Multiaqua, Inc.
2701 S.W. 145th Avenue, Suite 220
Miramar, FL 33027
Phone (954) 431-1300 • Fax (954) 431-1303 • www.multiaqua.com

Listed
MEA#311-00-E

MHNCCW

BLOWER DATA								
UNIT MODEL	TOTAL AMPS	MOTOR HP 230 (V)	NOMINAL CFM vs. EXTERNAL STATIC PRESSURE @ HI SPEED					
			0.05	0.10	0.15	0.20	0.25	0.30
MHNCCW04-01	.82	1/8	397	373	340	320	----------	----------
MHNCCW06-01	1.18	1/8	634	608	578	544	506	463
MHNCCW08-01	1.43	1/4	757	723	700	659	621	582
MHNCCW10-01	1.63	1/4	943	914	880	846	812	769
MHNCCW12-01	1.81	1/4	1228	1194	1160	1126	1088	1050

FOR 120 Volt USE-03 Suffix

PERFORMANCE DATA								
UNIT MODEL	NOMINAL COOLING BTUH @ 44 E.W.T.	2 ROW COIL HEATING GPM	BTU (1000) AT ENTERING WATER TEMPERATURE 70 E.A.T.					
			PD Ft. W	120 F	PD Ft. W	140 F	PD Ft. W	180 F
MHNCCW04-01	12.000	1	1.0	11.0	1.0	15.5	0.9	24.5
		2	3.4	13.4	3.3	18.9	3.1	29.9
		3	7.0	14.4	6.7	20.2	6.3	32.0
MHNCCW06-01	18.000	1	1.1	13.1	1.1	18.5	1.0	29.3
		2	3.7	16.9	3.6	23.8	3.3	37.7
		3	7.6	18.5	7.3	26.1	6.8	41.3
MHNCCW08-01	24.000	2	0.5	17.7	0.5	25.0	0.5	40.1
		3	1.1	20.0	1.1	28.3	1.0	45.2
		4	1.9	21.5	1.8	30.3	1.6	48.3
MHNCCW10-01	30.000	2	0.6	20.6	0.6	29.1	0.6	46.5
		3	1.3	23.7	1.2	33.5	1.1	53.4
		4	2.1	25.6	2.0	36.1	1.9	57.5
MHNCCW12-01	36.000	2	0.7	23.2	0.7	32.8	0.6	52.3
		3	1.5	27.0	1.4	38.2	1.3	60.9
		4	2.4	29.5	2.3	41.6	2.1	66.2

PHYSICAL DIMENSIONS (Inches)				
UNIT MODEL	WIDTH	DEPTH	HEIGHT	WEIGHT (Lbs)
MHNCCW04-01	37.72	21.65	10.00	66.00
MHNCCW06-01	37.72	21.65	10.00	68.20
MHNCCW08-01	37.72	21.65	10.00	72.60
MHNCCW10-01	43.70	21.65	10.00	74.80
MHNCCW12-01	49.68	21.65	10.00	83.60

Multiaqua, Inc.
2701 S.W. 145th Avenue, Suite 220
Miramar, FL 33027
Phone (954) 431-1300 • Fax (954) 431-1303 • www.multiaqua.com

ETL Listed C US

MCCW Chilled Water Fan Coil Specifications

Model	MCCW-04	MCCW-06	MCCW-08	MCCW-12	MCCW-16	MCCW-20
Description	"1 Ton" 208/230V-1-50/60	"1.5 Ton" 208/230V-1-50/60	"2 Ton" 208/230V-1-50/60	"3 Ton" 208/230V-1-50/60	"4 Ton" 208/230V-1-50/60	"5 Ton" 208/230V-1-50/60
Cooling Capacity (BTUH)	11,300	17,000	22,200	36,400	45,100	55,500
Airflow (CFM) [1]	450	520	665	940	1390	1400
Motor HP - Speeds	1/15-3	1/15-3	1/8-3	1/4-3	1/2-3	1/2-3
Supply Voltage	1-60-208/230					
Motor Power Consumption (Watts)	124	124	183	333	625	625
Blower Size - Qty.	5.75 " x 8"- 2	5.75" x 8"- 2	6.25" x 8"- 2	7" x 7"- 2	7" x 9"- 2	7" x 9"- 2
Coil Type	Aluminum Plate Fin, Plain Copper Tube					
No. of Rows - FPI	2 - 13	3 - 13	3 - 14	4 - 14	3 - 14	3 - 14
Coil Face Area (Sq. Ft.)	1.71	1.71	2.13	2.84	3.4	4.06
Water In (Inches)	1/2	1/2	1/2	3/4	3/4	1
Water Out (Inches)	1/2	1/2	1/2	3/4	3/4	1
Drain Connection (Inches)	1/2	1/2	1/2	1/2	1/2	1/2
Dimensions (Inches) Width	36.61	36.61	36.61	48.5	48.5	56.1
Depth	18.11	18.11	18.11	18.11	20	20
Height	9.64	9.64	11.5	11.81	13.78	13.78
Approx. Weight in Lb.'s	38.6	41.89	44.1	65	68.34	72.8
Pressure Drop (feet of H^2O)	8.6	24.4	18.6	29.7	25	43.7
Flow Rate (GPM)	2.4	3.6	4.8	7.2	9.6	12

[1] Capacity listed at 44°F L.W.T., 55ºF E.W.T.
Based upon .15 static discharge

MCCW Heating Capacities Hideaway/Ceiling Concealed

MCCW04 Heating Capacity (BTUH) at 2.4 GPM

EAT	100 EWT	110 EWT	120 EWT	130 EWT	140 EWT	150 EWT	160 EWT	170 EWT	180 EWT	190 EWT	200 EWT
50	13998	16816	19645	22483	25328	28180	31036	33895	36757	39621	42486
60	11243	14052	16873	19705	22544	25390	28241	31096	33955	36815	39677
70	8483	11284	14099	16924	19757	22598	25444	28295	31150	34007	36866
80	5720	8514	11321	14140	16968	19803	22645	25492	28343	31197	34053

MCCW06 Heating Capacity (BTUH) at 3.6 GPM

EAT	100 EWT	110 EWT	120 EWT	130 EWT	140 EWT	150 EWT	160 EWT	170 EWT	180 EWT	190 EWT	200 EWT
50	19785	23765	27756	31754	35759	39769	43783	47799	51818	55837	59858
60	15859	19832	23816	27809	31808	35813	39822	43835	47850	51867	55884
70	11931	15897	19874	23861	27855	31855	35860	39869	43881	47895	51910
80	8000	11958	15736	19910	23900	27895	31896	35902	39910	43921	47934

MCCW08 Heating Capacity (BTUH) at 4.8 GPM

EAT	100 EWT	110 EWT	120 EWT	130 EWT	140 EWT	150 EWT	160 EWT	170 EWT	180 EWT	190 EWT	200 EWT
50	25437	30560	35697	40846	46004	51170	56341	61516	66694	71873	77054
60	20396	25508	30635	35775	40925	46083	51248	56418	61591	66766	71943
70	15351	20451	25569	30700	35843	40994	46153	51317	56485	61656	66829
80	10301	15391	20499	25622	30758	35902	41055	46214	51377	56544	61714

MCCW12 Heating Capacity (BTUH) at 7.2 GPM

EAT	100 EWT	110 EWT	120 EWT	130 EWT	140 EWT	150 EWT	160 EWT	170 EWT	180 EWT	190 EWT	200 EWT
50	40270	48345	56437	64542	72657	80780	88908	97040	105173	113308	121442
60	32289	40351	48432	56527	64633	72747	80869	88994	97123	105253	113383
70	24302	32352	40422	48507	56604	64711	72826	80946	89069	97194	105321
80	16309	24348	32407	40483	48572	56672	64780	72894	81012	89134	97257

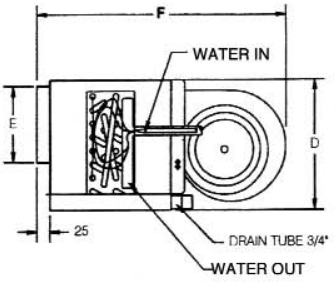
MCCW16 Heating Capacity (BTUH) at 9.6 GPM

EAT	100 EWT	110 EWT	120 EWT	130 EWT	140 EWT	150 EWT	160 EWT	170 EWT	180 EWT	190 EWT	200 EWT
50	52762	63322	73915	84535	95176	105833	116503	127183	137869	148559	159252
60	42381	52917	63488	74088	84711	95352	106008	116675	127350	138031	148715
70	31990	42502	53052	63633	74239	84865	95507	106162	116826	127498	138173
80	21588	32077	42607	53169	63759	74371	85000	95643	106297	116959	127627

MCCW20 Heating Capacity (BTUH) at 12 GPM

EAT	100 EWT	110 EWT	120 EWT	130 EWT	140 EWT	150 EWT	160 EWT	170 EWT	180 EWT	190 EWT	200 EWT
50	60476	72588	84724	96880	109050	121232	133422	145617	157816	170017	182218
60	48498	60591	72711	84852	97009	109179	121358	133545	145736	157930	170125
70	36513	48588	60692	72818	84963	97121	109291	121469	133652	145840	158029
80	24521	36579	48667	60779	72911	85059	97219	109388	121565	133746	145929

Dimension MM.(inch) / Model	A	B	C	D	E	F
CCW04	(37.72)	(33.19)	(31.54)	(9.72)	(5.47)	(17.91)
CCW06	(37.72)	(33.19)	(31.54)	(9.72)	(5.47)	(17.91)
CCW08	(37.72)	(33.19)	(31.54)	(11.73)	(7.44)	(17.91)
CCW12	(48.74)	(44.21)	(42.56)	(11.73)	(7.44)	(19.80)
CCW16	(56.38)	(51.85)	(50.20)	(13.74)	(9.49)	(19.80)
CCW20	(56.38)	(51.85)	(50.20)	(13.74)	(9.49)	(19.80)



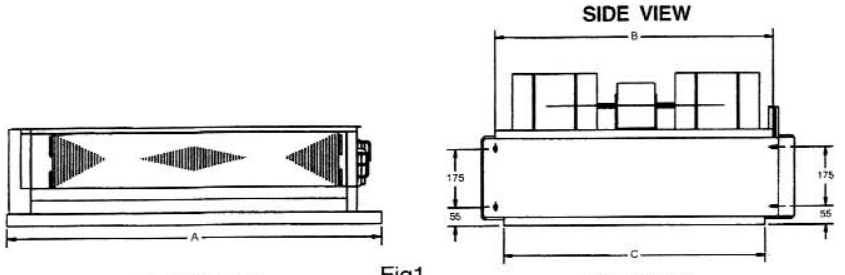


Fig1
Layout for
CCW04-20

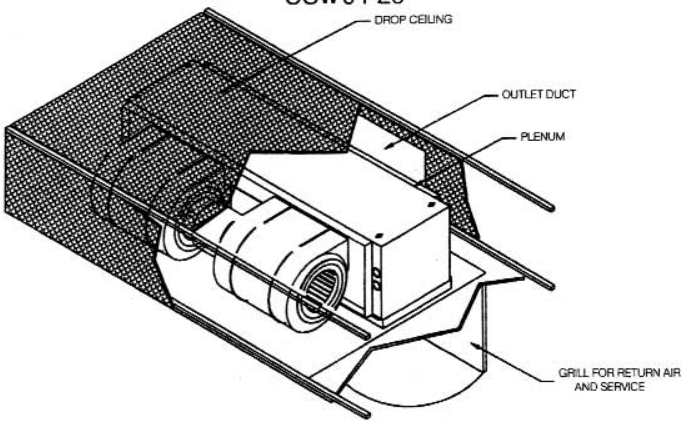


Fig2
Drop Ceiling
Installation

Mounting Instructions Concealed Water Fan Coil

A. GENERAL

1a. INSTALLATION - This product is designed and manufactured to permit installation in accordance with National Codes. It is the installer's responsibility to install the product in accordance with National Codes and / or prevailing local codes and regulation.

1B. PRE - INSTALLATION CHECK - POINTS

- Before attempting any installation, the following points should be considered.

- Structural strength of supporting members.
- Clearances and provision for servicing.
- Power supply and wiring.
- Drain facility and connections.

2a. Location - These units are designed to be installed in horizontal position above a dropped ceiling. The location of the unit should be based on thorough consideration of the PRE - INSTALLATION CHECK POINTS.

B. INSTALLATION

1. Before locating the unit on the drop ceiling, make sure that the strength of the ceiling and beams is adequate at the point to support the weight involved. This is very important and installer's responsibility. The list on the right shows approximate weight of unit.

MODEL	NET WEIGHT (LBS)
CCW04	38.60
CCW06	41.89
CCW08	44.10
CCW12	65.10
CCW16	68.34
CCW20	72.80

Multiaqua™

Hideaway/Ceiling Concealed Dx Fan Coils

MCCX Dx Fan Coil Specifications						
Model	**MCCX-04**	**MCCX-06**	**MCCX-08**	**MCCX-12**	**MCCX-16**	**MCCX-20**
Description	"1 Ton" 208/230V-1-50/60	"1.5 Ton" 208/230V-1-50/60	"2 Ton" 208/230V-1-50/60	"3 Ton" 208/230V-1-50/60	"4 Ton" 208/230V-1-50/60	"5 Ton" 208/230V-1-50/60
Cooling Capacity (BTUH)	12,000	18,000	24,000	34,000	48,000	58,000
Airflow (CFM)	450	520	665	940	1390	1400
Motor HP - Qty.	1/15-1	1/15-1	1/8-1	1/4-1	1/2-1	1/2-1
Supply Voltage	1-50/60-208/230 Volt					
Motor Power Consumption (Watts)	124	124	183	333	625	625
Blower Size - Qty.	5.75 " x 8"- 2	5.75" x 8"- 2	6.25" x 8"- 2	7" x 7"- 2	7" x 9"- 2	7" x 9"- 2
Coil Type	Aluminum Plate Fin, Grooved Tube					
No. of Rows - FPI	2 - 13	3 - 13	4 - 14	3 - 14	3 - 14	3 - 14
Coil Face Area (Ft.^{2})	1.71	1.71	1.71	2.78	3.33	4.00
Liquid Line - Sweat (Inches)	3/8	3/8	3/8	3/8	3/8	3/8
Suction Line - Sweat (Inches)	1/2	5/8	5/8	5/8	3/4	3/4
Drain Connection (Inches)	1/2	1/2	1/2	1/2	1/2	1/2
Dimensions (Inches) Width	36.61	36.61	36.61	48.5	48.5	56.1
Depth	18.11	18.11	18.11	18.11	20	20
Height	9.64	9.64	9.72	11.81	13.78	13.78
Approx. Weight in Lb.'s	38.6	41.89	44.1	65	68.34	72.8

* Please add (-13) for 13 Seer equipment.
* Cooling based on 75% Sensible, 25% Latent, 80°D.B./67°W.B.

MHCCX Series Direct Expansion Fan Coil Specifications
1 through 3 Tons with 4 & 5 Ton soon to be available

DX Cooling w/Electric heat

Performance Data Model #	Nominal Cooling Cap--(BTUH)	Nominal Airflow (CFM)	Heat KW	Heat BTUH	Total Amps	Min. Cir. Ampacity	Motor HP Qty	Supply Voltage	Motor Cons-Watt	Blower Size--Qty	Coil Type	Rows FPI	Coil Face (Ft Sq)	Liq Line Inches	Suct Line Inches	Drain Conn	Dimensions (inches) Width	Depth	Height	Weight Lbs.
MHCCX04-00	12,000	400	0	-	0.82	1.00	1/8 x1	208/230--50/60	170	GI 6x7 -2		2 - 14	1.67	3/8	1/2	3/4	37.72	21.65	10	66.00
-03	12,000	400	3	10,200	13.86	19.31	1/8 x1	208/230--50/60	170	GI 6x7 -2		2 - 14	1.67	3/8	1/2	3/4	37.72	21.65	10	66.00
-05	12,000	400	5	17,000	22.56	31.60	1/8 x1	208/230--50/60	170	GI 6x7 -2		2 - 14	1.67	3/8	1/2	3/4	37.72	21.65	10	66.00
-06	12,000	400	6	20,500	26.90	37.60	1/8 x1	208/230--50/60	170	GI 6x7 -2		2 - 14	1.67	3/8	1/2	3/4	37.72	21.65	10	66.00
-08	12,000	400	8	27,300	35.60	48.30	1/8 x1	208/230--50/60	170	GI 6x7 -2		2 - 14	1.67	3/8	1/2	3/4	37.72	21.65	10	66.00
MHCCX06-00	18,000	600	0	-	1.18	1.48	1/8 x1	208/230--50/60	275	GI 6x7 -2		3 - 14	1.67	3/8	5/8	3/4	37.72	21.65	10	68.20
-03	18,000	600	3	10,200	14.22	19.76	1/8 x1	208/230--50/60	275	GI 6x7 -2		3 - 14	1.67	3/8	5/8	3/4	37.72	21.65	10	68.20
-05	18,000	600	5	17,000	22.92	32.05	1/8 x1	208/230--50/60	275	GI 6x7 -2		3 - 14	1.67	3/8	5/8	3/4	37.72	21.65	10	68.20
-06	18,000	600	6	20,500	27.27	38.05	1/8 x1	208/230--50/60	275	GI 6x7 -2		3 - 14	1.67	3/8	5/8	3/4	37.72	21.65	10	68.20
-08	18,000	600	8	27,300	35.96	48.75	1/8 x1	208/230--50/60	275	GI 6x7 -2		3 - 14	1.67	3/8	5/8	3/4	37.72	21.65	10	68.20
MHCCX08-00	24,000	800	0	-	1.43	1.80	1/4 x1	208/230--50/60	325	GI 6x7 -2		4 -14	1.67	3/8	5/8	3/4	37.72	21.65	10	72.60
-03	24,000	800	3	10,200	14.47	20.08	1/4 x1	208/230--50/60	325	GI 6x7 -2		4 - 14	1.67	3/8	5/8	3/4	37.72	21.65	10	72.60
-05	24,000	800	5	17,000	23.17	32.36	1/4 x1	208/230--50/60	325	GI 6x7 -2		4 - 14	1.67	3/8	5/8	3/4	37.72	21.65	10	72.60
-06	24,000	800	6	20,500	27.52	38.36	1/4 x1	208/230--50/60	325	GI 6x7 -2		4 - 14	1.67	3/8	5/8	3/4	37.72	21.65	10	72.60
-08	24,000	800	8	27,300	36.21	49.06	1/4 x1	208/230--50/60	325	GI 6x7 -2		4 - 14	1.67	3/8	5/8	3/4	37.72	21.65	10	72.60
MHCCX10-00	30,000	1000	0	-	1.43	1.80	1/4 x1	208/230--50/60	325	AL 6x8 -2		4 - 14	2.00	3/8	5/8	3/4	43.7	21.65	10	74.80
-03	30,000	1000	3	10,200	14.47	20.08	1/4 x1	208/230--50/60	325	AL 6x8 -2		4 -14	2.00	3/8	5/8	3/4	43.7	21.65	10	74.80
-05	30,000	1000	5	17,000	23.17	32.36	1/4 x1	208/230--50/60	325	AL 6x8 -2		4 - 14	2.00	3/8	5/8	3/4	43.7	21.65	10	74.80
-06	30,000	1000	6	20,500	27.52	38.36	1/4 x1	208/230--50/60	325	AL 6x8 -2		4 - 14	2.00	3/8	5/8	3/4	43.7	21.65	10	74.80
-08	30,000	1000	8	27,300	36.21	49.06	1/4 x1	208/230--50/60	325	AL 6x8 -2		4 - 14	2.00	3/8	5/8	3/4	43.7	21.65	10	74.80
MHCCX12-00	36,000	1200	0	-	1.81	2.26	1/4 x1	208/230--50/60	420	AL 6x9 -2		4 - 14	2.33	3/8	5/8	3/4	49.68	21.65	10	83.60
-03	36,000	1200	3	10,200	14.85	20.55	1/4 x1	208/230--50/60	420	AL 6x9 -2		4 - 14	2.33	3/8	5/8	3/4	49.68	21.65	10	83.60
-05	36,000	1200	5	17,000	23.55	32.84	1/4 x1	208/230--50/60	420	AL 6x9 -2		4 -14	2.33	3/8	5/8	3/4	49.68	21.65	10	83.60
-06	36,000	1200	6	20,500	27.90	38.84	1/4 x1	208/230--50/60	420	AL 6x9 -2		4 - 14	2.33	3/8	5/8	3/4	49.68	21.65	10	83.60
-08	36,000	1200	8	27,300	36.60	49.54	1/4 x1	208/230--50/60	420	AL 6x9 -2		4 - 14	2.33	3/8	5/8	3/4	49.68	21.65	10	83.60

AL Fin, Grooved Cu Tube

III. DX /Water Hideaway Fan Coils with Electric Heat
CFM vs. External Static Pressure Tables

Series DX	Description Water	CFM vs. External Static Pressure Tables 0.00	0.05	0.10	0.15	0.20	0.25	0.30
MHCCX04	1 Ton	485	455	415	370	325	0	0
MHCCX06	1 1/2Ton	775	745	715	680	640	595	545
MHCCX08	2 Ton	915	890	850	815	775	730	685
MHCCX10	2 1/2Ton	1145	1110	1075	1035	995	955	905
MHCCX12	3 Ton	1480	1445	1405	1365	1325	1280	1235

MHNCCX

BLOWER DATA								
UNIT MODEL	TOTAL AMPS	MOTOR HP 230 (V)	NOMINAL CFM vs. EXTERNAL STATIC PRESSURE @ HI SPEED					
			0.05	0.10	0.15	0.20	0.25	0.30
MHNCCX04-01	.82	1/8	397	373	340	320	----------	----------
MHNCCX06-01	1.18	1/8	634	608	578	544	506	463
MHNCCX08-01	1.43	1/4	757	723	700	659	621	582
MHNCCX10-01	1.63	1/4	943	914	880	846	812	769
MHNCCX12-01	1.81	1/4	1228	1194	1160	1126	1088	1050

FOR 120 Volt USE-03 Suffix

PERFORMANCE DATA								
UNIT MODEL	DX NOMINAL COOLING BTUH 80 DB/67 WB	2 ROW COIL HEATING GPM	BTU (1000) AT ENTERING WATER TEMPERATURE 70 E.A.T.					
			PD Ft. W	120 F	PD Ft. W	140 F	PD Ft. W	180 F
MHNCCX04-01	12.000	1	1.0	11.0	1.0	15.5	0.9	24.5
		2	3.4	13.4	3.3	18.9	3.1	29.9
		3	7.0	14.4	6.7	20.2	6.3	32.0
MHNCCX06-01	18.000	1	1.1	13.1	1.1	18.5	1.0	29.3
		2	3.7	16.9	3.6	23.8	3.3	37.7
		3	7.6	18.5	7.3	26.1	6.8	41.3
MHNCCX08-01	24.000	2	0.5	17.7	0.5	25.0	0.5	40.1
		3	1.1	20.0	1.1	28.3	1.0	45.2
		4	1.9	21.5	1.8	30.3	1.6	48.3
MHNCCX10-01	30.000	2	0.6	20.6	0.6	29.1	0.6	46.5
		3	1.3	23.7	1.2	33.5	1.1	53.4
		4	2.1	25.6	2.0	36.1	1.9	57.5
MHNCCX12-01	36.000	2	0.7	23.2	0.7	32.8	0.6	52.3
		3	1.5	27.0	1.4	38.2	1.3	60.9
		4	2.4	29.5	2.3	41.6	2.1	66.2

PHYSICAL DIMENSIONS (Inches)				
UNIT MODEL	WIDTH	DEPTH	HEIGHT	WEIGHT (Lbs)
MHNCCX04-01	37.72	21.65	10.00	66.00
MHNCCX06-01	37.72	21.65	10.00	68.20
MHNCCX08-01	37.72	21.65	10.00	72.60
MHNCCX10-01	43.70	21.65	10.00	74.80
MHNCCX12-01	49.68	21.65	10.00	83.60

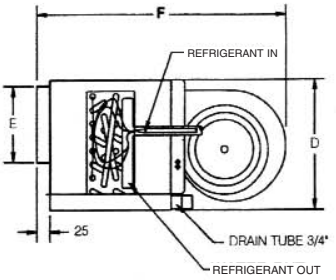
NOTES: 13 SEER Compatible when fitted with thermal Expansion Valve

When Ordering 13 Seer Add – 13 suffix

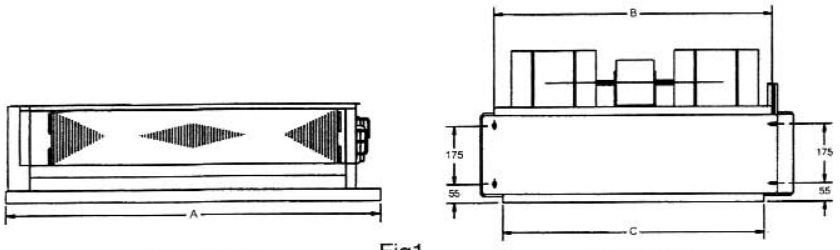
Multiaqua, Inc.
2701 S.W. 145th Avenue, Suite 220
Miramar, FL 33027
Phone (954) 431-1300 • Fax (954) 431-1303 • www.multiaqua.com

ETL Listed C US

Dimension MM.(inch) / Model	A	B	C	D	E	F
CCX04 / CCW04	(37.72)	(33.19)	(31.54)	(9.72)	(5.47)	(17.91)
CCX06 / CCW06	(37.72)	(33.19)	(31.54)	(9.72)	(5.47)	(17.91)
CCX08 / CCW08	(37.72)	(33.19)	(31.54)	(9.72)	(5.47)	(17.91)
CCX12 / CCW12	(48.74)	(44.21)	(42.56)	(11.73)	(7.44)	(19.80)
CCX16 / CCW16	(48.39)	(43.86)	(42.20)	(13.74)	(9.49)	(19.80)
CCX20 / CCW20	(56.38)	(51.85)	(50.20)	(13.74)	(9.49)	(19.80)



SIDE VIEW



FRONT VIEW

TOP VIEW

Fig1
Layout for
CCX04-20

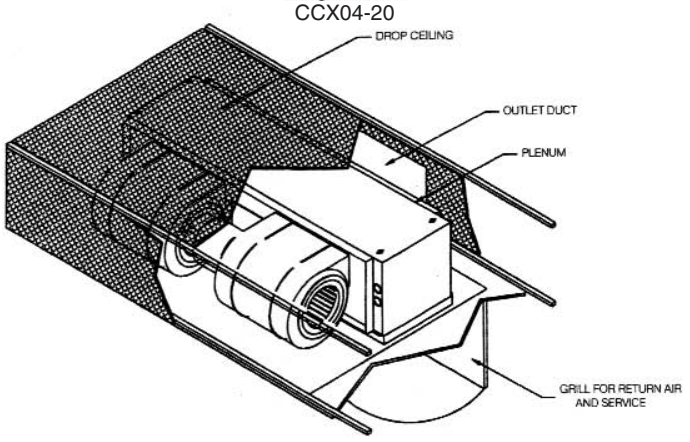


Fig2
Drop Ceiling
Installation

Mounting Instructions Concealed DX Fan Coil

A. GENERAL

1a. INSTALLATION - This product is designed and manufactured to permit installation in accordance with National Codes. It is the installer's responsibility to install the product in accordance with National Codes and / or prevailing local codes and regulation.

1B. PRE - INSTALLATION CHECK - POINTS

- Before attempting any installation, the following points should be considered.

- Structural strength of supporting members.
- Clearances and provision for servicing.
- Power supply and wiring.
- Drain facility and connections.

2a. Location - These units are designed to be installed in horizontal position above a dropped ceiling. The location of the unit should be based on thorough consideration of the PRE - INSTALLATION CHECK POINTS.

B. INSTALLATION

1. Before locating the unit on the drop ceiling, make sure that the strength of the ceiling and beams is adequate at the point to support the weight involved. This is very important and installer's responsibility. The list on the right shows approximate weight of unit.

MODEL	NET WEIGHT (LBS)
CCX04	38.60
CCX06	41.89
CCX08	44.10
CCX12	65.10
CCX16	68.34
CCX20	72.80
CCW20	

Multi aqua™

Universal Mount
CFFWA & CFFZA Water Fan Coil
Available with Wired or Wireless Remote Control Option

(CFFWA & CFFZA) Chilled Water Fan Coil Specifications

Model	CFFWA-04	CFFWA-06	CFFWA-08	CFFWA-12	CFFWA-16	CFFWA-20
Description	"1 Ton" 220V-1-50/60	"1.5 Ton" 220V-1-50/60	"2 Ton" 220V-1-50/60	"3 Ton" 220V-1-50/60	"4 Ton" 220V-1-50/60	"5 Ton" 220V-1-50/60
Cooling Capacity (BTUH)	11,400	17,300	22,400	36,000	46,600	50,600
Airflow (CFM) [1]	436	520	650	735	1360	1335
Motor HP - Speeds	1/15-3	1/15-3	1/8-3	1/8-3, 1/20-3	1/8-3	1/8-3
Supply Voltage	1-50/60-208/230 Volt					
Fan Motor Power Consumption	124	124	183	297	366	366
Blower Size - Qty.	6" x 8"- 2	6" x 8" - 2	7" x 8" - 2	7" x 8" - 2	7" x 8" - 4	7" x 8" - 4
Coil Type	Aluminum Plate Fin, 3/8" Copper Tubing					
No. of Rows - FPI	2 - 13	3 - 13	4 - 13	3 - 13	3 - 14	4 - 14
Coil Face Area (Sq. Ft.)	1.67	1.67	1.67	2.78	4.17	4.17
Water In (Inches)	1/2	1/2	1/2	3/4	3/4	1
Water Out (Inches)	1/2	1/2	1/2	3/4	3/4	1
Drain Connection (Inches)	1/2	1/2	1/2	1/2	1/2	1/2
Dimensions (Inches) Width	40.31	40.31	40.31	52.13	75.78	75.78
Height	25.27	25.27	25.27	25.27	25.27	25.27
Depth	9.01	9.01	9.01	9.01	9.01	9.01
Approx. Weight in Lbs.	79.37	83.77	88.18	116.84	158.73	163.14
Pressure Drop (feet of H^2O)	5	17	14	20	26	18
Flow Rate (GPM)	2.4	3.6	4.8	7.2	9.6	12

[1] Capacity listed at 44°F L.W.T., 55ºF E.W.T.

(CFFW & CFFZA) Heating Capacities Universal Mount

CFFW04 Heating Capacity(BTUH) at 2.4 GPM				
EAT	100 EWT	110 EWT	120 EWT	130 EWT
50	14024	16846	19680	22524
60	11264	14078	16905	19741
70	8500	11307	14126	16956
80	5733	8531	11344	14168

CFFW06 Heating Capacity(BTUH) at 3.6 GPM				
EAT	100 EWT	110 EWT	120 EWT	130 EWT
50	19889	23890	27901	31920
60	15946	19939	23943	27956
70	12000	15985	19982	23989
80	8050	12028	16019	20020

CFFW08 Heating Capacity(BTUH) at 4.8 GPM				
EAT	100 EWT	110 EWT	120 EWT	130 EWT
50	25846	31052	36273	41506
60	20725	25919	31130	35354
70	15598	20782	25983	31198
80	10468	15640	20832	26038

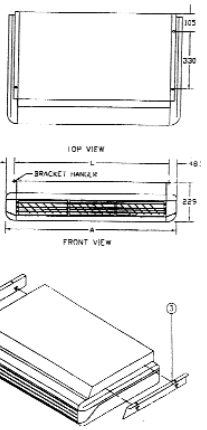
CFFW12 Heating Capacity(BTUH) at 7.3 GPM				
EAT	100 EWT	110 EWT	120 EWT	130 EWT
50	41728	50118	58526	66948
60	33442	41818	50213	58624
70	25149	33511	41895	50295
80	16850	25200	33572	41962

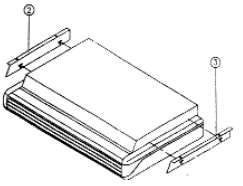
CFFW16 Heating Capacity(BTUH) at 9.6 GPM				
EAT	100 EWT	110 EWT	120 EWT	130 EWT
50	54255	65172	76116	87084
60	43499	54394	65320	76270
70	32734	43608	54515	65448
80	21959	32813	43702	54620

CFFW20 Heating Capacity(BTUH) at 12 GPM				
EAT	100 EWT	110 EWT	120 EWT	130 EWT
50	59779	71859	83974	96118
60	47899	59951	72042	84164
70	36008	48034	60100	72201
80	24107	36107	48151	60231

Note: CFFWA-Equipped w/wired remote: CFFZA-Equipped w/wired & wireless remote

Mounting Instructions-Universal Mount Water Fan Coil





MODEL	A	L
12-24	1024	927
30-36	1324	1227
48-60	1925	1828

INITIAL CHECK

1) The carton should not be removed from unit until reaching final location to avoid damage.
2) Inspect unit for shipping damage and file a claim with the transport agency if necessary.
3) Check field electrical works:
   a) Proper size of fuses and wire, correct wiring connections and grounding as specified by the local electrical codes.
   b) Also check supply voltage, which must be within the limits shown on the nameplate.
4) Check for a proper condensate flow.
5) Be sure piping insulation is adequate.
6) Confirm there are no obstructions to air flow for indoor and outdoor units. Also check for sufficient clearances for servicing the unit.

LOCATION & MOUNTING

1) The unit should be installed for horizontal and vertical discharge application only.
2) Select position for unit and define direction of refrigerant pipe, drain pipe and electrical wire.

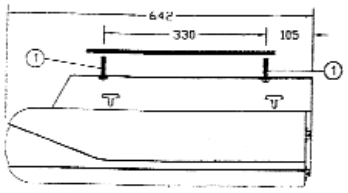


Fig 1

3) Prepare mounting bolt for mounting unit under ceiling or on a wall at the distance defined in figure 1.

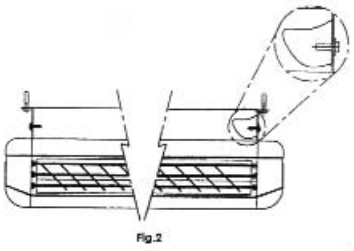


Fig.2

4) Remove unit from carton and carefully place the unit to the position and tighten the 4 bolts.

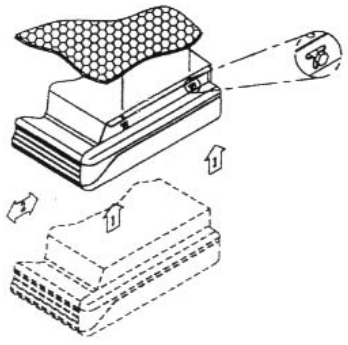


Fig.3

CONDENSATE DRAIN

1) Be sure the unit is reasonably level and pitched toward the drain to ensure proper drainage.
2) Piping material
   a) Soft Vinyl Chloride pipe
   b) Hard Vinyl Chloride (PVC)
3) Connect the soft/hard Vinyl Chloride pipe to the coupling. see fig 4

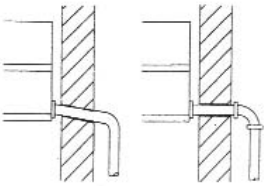


Fig. 4

4) The indoor unit uses gravity to drain: therefore the piping outside the unit should slope downward.
5) IMPORTANT: - avoid draining as shown in Fig 5

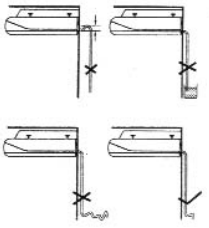
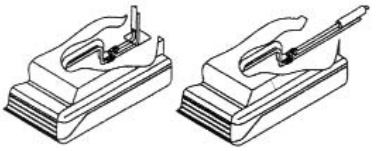


Fig. 5

REFRIGERANT PIPING

1) Connections to the indoor unit are flared connection.
   i) Make flared joints for both suction and liquid lines.
   ii) Ensure tube and fitting are in line with one another before tightening nut to allow concentric sealing of tube onto fitting to prevent leakage.
2) The liquid line and suction line should run according to piping design as shown in figure 6.
3) Brazing should be performed with a constant purge of nitrogen through the piping. This is to keep inside of tubing clean.
4) Insulate suction line adequately to prevent sweating.



Note: The piping may also be run around the rear of the unit so as to exit from the left of the unit

5) Use two spanners to connect the flare nut connection to the indoor unit. See figure 7.

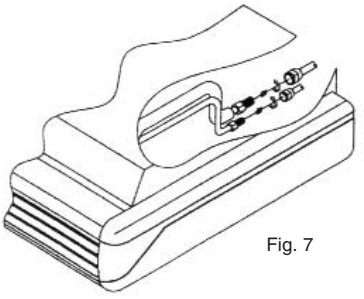


Fig. 7

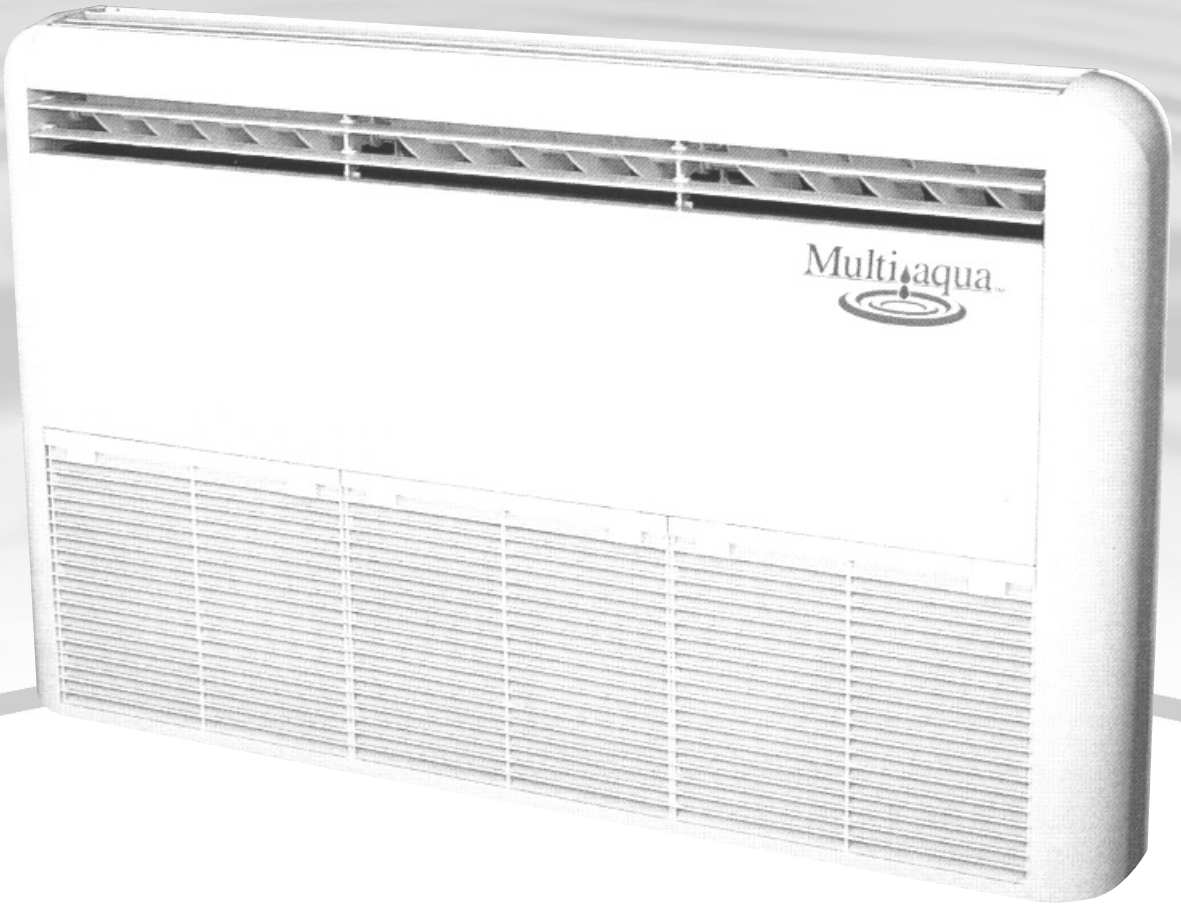
Multi aqua™

Universal Mount
FSFCA Dx Fan Coil
Available with Wired or Wireless Remote Control Option

FSFCA Dx Fan Coil Specifications

Model	FMG04	FMG06	FMG08	FMG10	FMG12	FMG16	FMG20
Cooling Capacity (BTUH)	12,000	18,000	24,000	30,000	36,000	48,000	60,000
Air Flow (CFM)	400	500	550	650	750	1150	1200
Motor HP - QTY	1/15-1	1/15-1	1/10-1	1/10-1	1/10-1,1/20-1	1/10-2	1/10-2
Power Supply	1-60-208/230 Volts						
Power Consumption (Watts)	124	124	183	183	183+114	2x183	2x183
Blower Size - Quantity	6" x 8"	6" x 8"	7" x 8"	7" x 8"	7" x 8" -2	7" x 8" -4	7" x 8" -4
	2	2	2	2	6" x 8" -1		
Coil Type	Aluminium Plate Fin, Grooved Tube Copper						
No. of Rows - FPI	2-13	3-13	4-13	3-13	3-13	3-14	4-14
Coil Face Area (Sq. Ft.)	1.67	1.67	1.67	2.78	2.78	4.17	4.17
Liquid Connection (Inch)	3/8	3/8	3/8	3/8	3/8	3/8	3/8
Suction Connection (Inch)	1/2	5/8	5/8	5/8	5/8	3/4	3/4
Drain Connection (Inch)	1/2	1/2	1/2	1/2	1/2	1/2	1/2
Dimension (Inches)							
Width	38.32	38.32	38.32	50.32	62.32	74.32	74.32
Height	25.72	25.72	25.72	25.72	25.72	25.72	25.72
Depth	9.20	9.20	9.20	9.20	9.20	9.20	9.20
Approx. Weight (Lbs.)	88	90.2	96.8	103.4	143	154	156.2

Multi aqua™



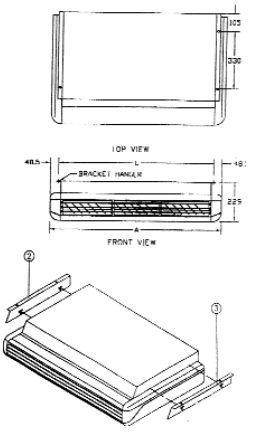
Universal Mount CFFCA Dx Fan Coil

With Wired Remote Control

CFFC Dx Fan Coil Specifications						
Model	CFFCA-04	CFFCA-06	CFFCA-08	CFFCA-12	CFFCA-16	CFFCA-20
Description	FCFCA	FCFCA				
Cooling Capacity (BTUH) Nominal	12,000	18,000	24,000	36,000	48,000	58,400
Airflow (CFM) @ High-Speed	436	520	650	735	1360	1335
Motor HP - Qty.	1/15-1	1/15-1	1/8-1	1/8-1,1/20-1	1/8-2	1/8-2
Supply Voltage	1-50/60-208/230 Volt					
Motor Power Consumption (Watts)	124	124	183	297	366	366
Blower Size - Qty.	6” x 8”- 2	6” x 8”- 2	7” x 8”- 2	7” x 8”- 2	7” x 8”- 4	7” x 8”- 4
Coil Type	Aluminum Plate Fin, 3/8” Grooved Tube Copper					
No. of Rows - FPI	2 - 13	3 - 13	4 - 13	3 - 13	3 - 14	3 - 14
Coil Face Area ($Ft.^2$)	1.67	1.67	1.67	2.78	4.17	4.17
Liquid Line - Sweat (Inches)	3/8	3/8	3/8	3/8	3/8	3/8
Suction Line - Sweat (Inches)	1/2	5/8	5/8	5/8	3/4	3/4
Drain Connection (Inches)	1/2	1/2	1/2	1/2	1/2	1/2
Dimensions (Inches) Width	40.31	40.31	40.31	52.13	75.78	75.78
Height	25.27	25.27	25.27	25.27	25.27	25.27
Depth	9.01	9.01	9.01	9.01	9.01	9.01
Approx. Weight in Lb.’s	79.37	83.77	88.18	116.84	158.73	163.14

* Please add (-13) for 13 Seer equipment.
* Cooling based on 75% Sensible, 25% Latent, 80°D.B./67°W.B.

Mounting Instructions- Universal Mount DX Fan Coil



INITIAL CHECK

1) The carton should not be removed from unit until reaching final location to avoid damage.
2) Inspect unit for shipping damage and file a claim with the transport agency if necessary.
3) Check field electrical works:
   a) Proper size of fuses and wire, correct wiring connections and grounding as specified by the local electrical codes.
   b) Also check supply voltage, which must be within the limits shown on the nameplate.
4) Check for a proper condensate flow.
5) Be sure piping insulation is adequate.
6) Confirm there are no obstructions to air flow for indoor and outdoor units. Also check for sufficient clearances for servicing the unit.

LOCATION & MOUNTING

1) The unit should be installed for horizontal and vertical discharge application only.
2) Select position for unit and define direction of refrigerant pipe, drain pipe and electrical wire.

MODEL	A	L
12-24	1024	927
30-36	1324	1227
48-60	1925	1828

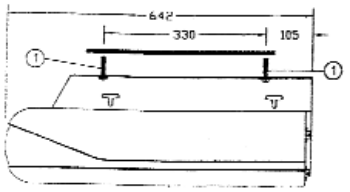


Fig 1

3) Prepare mounting bolt for mounting unit under ceiling or on a wall at the distance defined in figure 1.

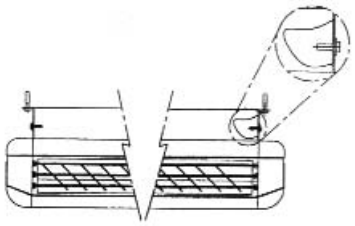


Fig.2

4) Remove unit from carton and carefully place the unit to the position and tighten the 4 bolts.

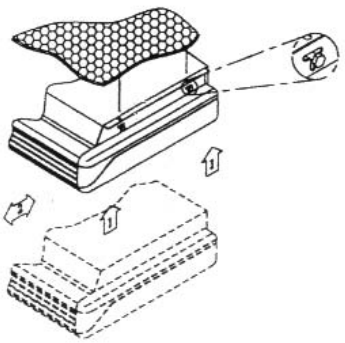


Fig.3

CONDENSATE DRAIN

1) Be sure the unit is reasonably level and pitched toward the drain to ensure proper drainage.
2) Piping material
   a) Soft Vinyl Chloride pipe
   b) Hard Vinyl Chloride (PVC)
3) Connect the soft/hard Vinyl Chloride pipe to the coupling. see fig 4

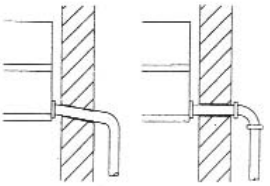


Fig. 4

4) The indoor unit uses gravity to drain: therefore the piping outside the unit should slope downward.
5) IMPORTANT: - avoid draining as shown in Fig 5

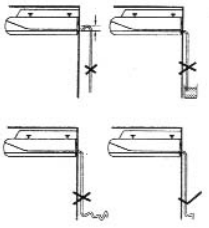
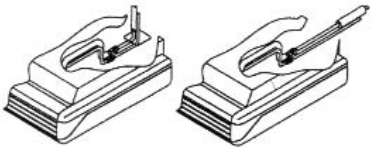


Fig. 5

REFRIGERANT PIPING

1) Connections to the indoor unit are flared connection.
   i) Make flared joints for both suction and liquid lines.
   ii) Ensure tube and fitting are in line with one another before tightening nut to allow concentric sealing of tube onto fitting to prevent leakage.
2) The liquid line and suction line should run according to piping design as shown in figure 6.
3) Brazing should be performed with a constant purge of nitrogen through the piping. This is to keep inside of tubing clean.
4) Insulate suction line adequately to prevent sweating.



Note: The piping may also be run around the rear of the unit so as to exit from the left of the unit

5) Use two spanners to connect the flare nut connection to the indoor unit. See figure 7.

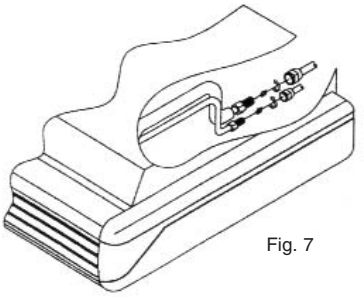


Fig. 7

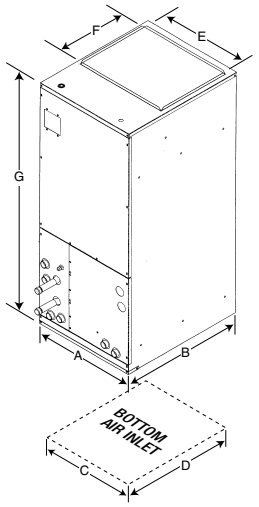
Multi aqua™

CWA2 Multi Position Water Air Handler

CWA2 SERIES™

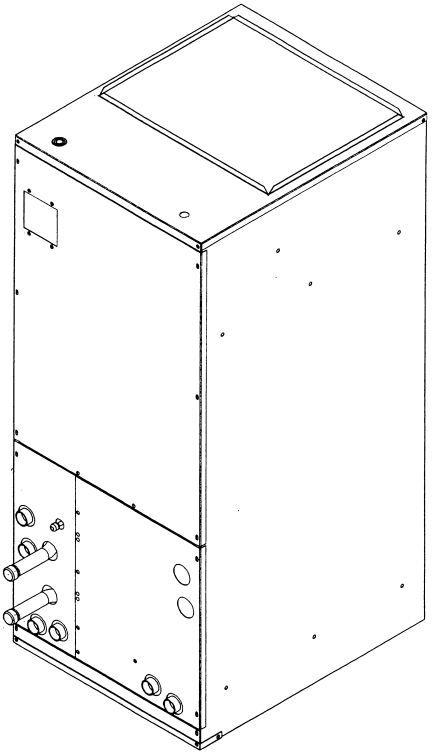
Air Handler / Chilled Water / Electric

Multiposition Design With Chilled Water Coil (0-20 KW) (Upflow/Horizontal Left or Horizontal Right *)



Description:

The CWA2-XX chilled water air handler with electric heat series is designed for multi-position applications in closet, attic or basement installations. The 24CWA2-XX unit handles up to 800 CFM of air movement, 1.5 to 2.0 tons of cooling and up to 10 KW of electric heat. The 36CWA2-XX unit handles up to 1200 CFM of air movement, up to 3.0 tons of cooling and up to 15KW of electric heat. The 48CWA2-XX unit handles up to 1750 CFM of air movement, 3.0 to 4.0 ton's of cooling and up to 20 KW of electric heat.The 60CWA2-XX unit will move up to 2100 CFM of air, 3 to 5 tons of cooling and up to 20KW of electric heat. For cooling requirements, these units are designed with 2-pipe chilled water a-coils. These units are UL & ULc listed (Approved for Canada).



Physical Dimensions

Model No.	A	B	C	D	E	F	G
24CWA2-XX 36CWA2-XX	17 1/2	21	15	17 1/2	16	12 5/8	39 3/4
48CWA2-XX 60CWA2-XX	21 1/2	25	19 1/4	22 1/4	19 5/8	17 1/4	49 3/4

Note: "-XX" indicates electric heat (KW) size.

Standard Features:

- Upflow, horizontal right to left and (*) easily field converted to horizontal left to right airflow without additional parts.
- Drain pans are plastic, thus non-rusting.
- Drain pans have primary and secondary drains for either Left or Right hand connections.
- Pre-painted (Designer Grey) front & top is the same high quality finish found on refrigerators today. Cabinet durability is ensured by using a heavy Ga. galvanized steel.
- All units are equipped with Time Delay Relay, factory installed (standard).
- All units have R4.2 Insulation, which meets Florida requirements (standard).
- All units include a 1-inch throwaway filter (standard).
- All units are 208/240V / 1 Phase / 60 HZ.
- All units are shipped with a 208/240V / 40VA transformer.
- All units are suitable for 0 inch clearance to combustible materials.
- Units are not suitable for Counterflow / Downflow applications.
- Blower assembly slides out for easy maintenance.
- Chilled water coil connections are swaged and then factory sealed with copper caps to maintain a nitrogen holding charge.

Optional Extra:

- Factory installed Circuit Breaker on 10 KW and below models.

General Specifications:

Model No.	Cooling Capacity	Blower	Nominal SCFM @.2ESP w/coil	KW
24CWA2-XX	1.5 - 2 Tons	-45	900	0-10
36CWA2-XX	2.5 - 3 Tons	-34	1200	0-15
48CWA2-XX	3 - 4 Tons	-55	1700	0-20
60CWA2-XX	5 Tons	-51	2100	0-20

Filters:

Model No.	Filter Size
24CWA2-XX	16x20x1
36CWA2-XX	20x20x1
48CWA2-XX	20x25x1
60CWA2-XX	20x25x1

Shipping Data:

Model No.	Max. Shp. Wt. w/coil	Qty. Per Truck Load
24CWA2-XX	118	192
36CWA2-XX	145	192
48CWA2-XX	170	144
60CWA2-XX	180	144

Blower Data:

Model No.	Airflow Tonnage Range	Motor @230V 1 Ph 60 Hz HP	Motor @230V 1 Ph 60 Hz FLA	DD Blower Wheel	3 Spd. Motor (Tons)	Duty	SCFM .1	SCFM .2
24CWA2-00	1.5 - 2.0	1/4	1.7	10x6	H(2.0)	Cool	950	900
24CWA2-05					M(1.5)	Cool	850	800
24CWA2-08					L	Heat	700	660
24CWA2-10								

Blower Data:

Model No.	Airflow Tonnage Range	Motor @230V 1 Ph 60 Hz HP	Motor @230V 1 Ph 60 Hz FLA	DD Blower Wheel	3 Spd. Motor (Tons)	Duty	SCFM vs. ESP (1) (2) .1	.2	.3	.4	.5
24CWA2-00	1.5 - 2.0	1/4	1.7	10x6	H(2.0)	Cool	950	900	850	790	720
24CWA2-05					M(1.5)	Cool	850	800	740	680	610
24CWA2-08					L	Heat	700	660	610	550	480
24CWA2-10											
36CWA2-00	2.5 - 3.0	1/3	2.8	10x7							
36CWA2-05					H(3.0)	Cool	1250	1200	1120	1060	1000
36CWA2-08					M(2.5)	Cool	1070	1020	970	920	860
36CWA2-10					L	Heat	900	870	840	790	720
36CWA2-15											
48CWA2-00	3.0 - 3.5	1/3	3.1	10x8							
48CWA2-05					H(4.0)	Cool	1850	1700	1650	1500	1410
48CWA2-08					M(3.5)	Cool	1750	1650	1450	1330	1180
48CWA2-10					L	Heat	1150	1060	1000	920	810
48CWA2-15											
48CWA2-20											
60CWA2-00	3.0 - 4.0	1/3	3.1	10x8							
60CWA2-05					H(5.0)	Cool	2160	2100	2000	1940	1880
60CWA2-08					M(4.0)	Cool	2110	1980	1810	1750	1650
60CWA2-10					L	Heat	2000	1860	1670	1340	1200
60CWA2-15											
60CWA2-20											

Notes: (1) Based upon unit w/nominal tonnage dry coil and filter installed.
(2) Use .96 as approximate SCFM correction factor for wet coil.

General Specifications:

Model No.	Cooling Capacity	Blower	Nominal SCFM @.2ESP w/coil	KW
24CWA2-XX	1.5 - 2 Tons	-45	900	0-10
36CWA2-XX	2.5 - 3 Tons	-34	1200	0-15
48CWA2-XX	3 - 4 Tons	-55	1700	0-20
60CWA2-XX	5 Tons	-51	2100	0-20

Shipping Data:

Model No.	Max. Shp. Wt. w/coil	Qty. Per Truck Load
24CWA2-XX	118	192
36CWA2-XX	145	192
48CWA2-XX	170	144
60CWA2-XX	180	144

Cooling Performance Data:

Multiposition Chilled Water Air Handler Model	Cooling Capacities @ Entering Water Temperature 80°F / 67°F / 45°F Total	80°F / 67°F / 45°F Sensible	80°F / 67°F / 42°F Total	80°F / 67°F / 42°F Sensible	CFM	GPM	Press. Drop Water (FT-WTR)	Press. Drop Air (WC)
18CWA2-XX (4-Row, "A-Coil")	11,500	9,200	12,200	9,150	400	3.0	1.8	0.10"
	12,520	10,016	13,400	10,050		4.5	3.9	
	13,150	10,520	14,140	10,605		6.0	6.8	
	15,730	12,584	16,600	12,450	600	3.5	2.4	0.18"
	17,000	13,600	18,100	13,575		5.0	4.8	
	17,900	14,320	19,140	14,355		6.5	7.9	
24CWA2-XX (4-Row, "A-Coil")	15,700	12,560	16,500	12,375	600	3.0	2.2	0.14"
	17,300	13,840	18,400	13,800		4.5	4.7	
	18,300	14,640	19,650	14,737		6.0	8.2	
	19,800	15,840	20,900	15,675	800	3.5	2.9	0.21"
	21,600	17,280	22,900	17,175		5.0	5.8	
	22,900	18,320	24,400	18,300		6.5	9.6	
36 CWA2-XX (4-Row, "A-Coil")	24,800	19,840	26,000	19,500	1,000	4.0	2.1	0.23"
	27,300	21,840	29,000	21,750		6.0	4.6	
	29,000	23,200	31,000	23,250		8.0	8.1	
	29,600	23,680	31,150	23,362	1,200	5.0	3.3	0.28"
	31,500	25,200	33,300	24,975		6.5	5.4	
	31,900	25,520	35,000	26,250		8.0	8.1	
48CWA2-XX (4-Row, "A-Coil")	32,000	25,600	33,400	25,050	1,400	4.5	1.2	0.24"
	34,500	27,600	36,250	27,187		6.0	2.2	
	36,400	29,120	38,500	28,875		7.5	3.3	
	37,700	30,160	39,500	29,625	1,600	6.0	2.2	0.25"
	40,500	32,400	42,700	32,025		8.0	3.8	
	42,600	34,080	45,100	33,825		10.0	5.8	
60CWA2-XX (4-Row, "A-Coil")	40,400	32,320	42,500	31,875	1,600	6.5	2.8	0.19"
	43,100	34,480	45,600	34,200		8.5	4.6	
	45,200	36,160	48,100	36,075		10.5	6.9	
	47,700	38,160	50,000	37,500	2,000	7.0	3.2	0.27"
	52,100	41,680	55,100	41,325		10.0	6.3	
	55,200	44,160	58,700	44,025		13.0	10.5	

Note: "-XX" indicates Electric Heat (KW) Size.

MAC Chiller Installation and Operation Manual

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Multiaqua Chiller Manual

The Multiaqua Chiller System is the only air conditioning/refrigeration system of it's kind in the world today offering the degree of application flexibility described in the following Manual.

The Multiaqua Chiller System is not only unique in its application flexibility; it is unique in superior quality, rated capacity, and rugged durability. When installed in accordance with these instructions the system will deliver years of trouble free service.

Proper equipment sizing, piping design and installation are critical to the performance of the chiller. This manual is meant to be a "how to" introduction to piping and installing the Multiaqua Chiller System.

⚠ **RECOGNIZE THIS SYMBOL AS AN INDICATION OF IMPORTANT SAFETY OR INSTALLATION RELATED INFORMATION.**

Pressure loss information for a Composite Piping system has been used in preparing this manual. Web site information addresses are supplied throughout this manual for piping and accessory information. The plumbing industry also has pressure drop information on ferrous and copper piping systems, which will vary from the composite pipe system outlined in this manual. Composite pipe is the recommended pipe for Multiaqua Chiller System installations, however existing piping systems can be adapted to the system.

The following sections will describe each component, and how it functions within the system. Installation information is supplied where appropriate. The piping design section will explain the design and layout out of the piping system from a "how to" perspective. Following the examples provided will enable the installer to determine the correct pipe and accessory sizing, as well as equipment location. It is important to know before installation if the proposed system will operate correctly, and doing a formal layout of a new application or review of an existing piping system will make that determination.

Throughout this manual the term l**iquid solution** is used in place of water. The chiller circulates a solution of water and propylene glycol.

⚠ **It is essential to operate the system with a minimum of 10% propylene glycol. DO NOT OPERATE THIS SYSTEM USING WATER ALONE!**

FOR PROPER LIQUID SOLUTIONS MIX RATIOS, REFER TO TABLE 6 OR THE GLYCOL MANUFACTURER'S RECOMMENDED MIX RATIOS.

System Description & Sequence of Operation

The Multiaqua chiller is a self-contained air-cooled condenser, coupled with an insulated brazed plate heat exchanger (evaporator). The system utilizes a scroll compressor to circulate refrigerant between the condenser and heat exchanger. The refrigerant is metered into the heat exchanger with a thermostatic expansion valve. Protecting the system are high and low pressure switches, as well as a pump flow switch.

Liquid solution (water and propylene glycol) is circulated through the heat exchanger by a chiller-mounted pump (the pump liquid side is manufactured of stainless steel, with silicon carbide/Viton seals). The liquid solution flows through the heat exchanger to the system supply piping, and on to the air handlers.

⚠ **The Pump will not self-prime. A full column of liquid solution is necessary for operation. Do not attempt to operate the pump without a full charge of liquid solution or seal damage will occur.**

A solenoid-operated or motorized valve controls the flow of chilled liquid solution through the air handlers. The valves can be actuated by a variety of different control schemes.

Liquid solution temperature is controlled by a chiller mounted digital electronic control. A system sequence of operation, individual control description, troubleshooting information, and a schematic are included in the controls section.

The chilled liquid solution piping system suggested for new installations is a Composite piping system and fittings. The Composite system delivers ease of installation, higher flow rates, and will not rust or corrode. Existing and new copper or ferrous piping systems are adaptable to the Multi-aqua system.

⚠ **It must be recognized that ferrous pipe may cause accelerated deterioration of the brazed plate heat exchanger and could void the heat exchanger warranty.**

Included in this manual is a piping section that includes piping system design, installation, and balancing.

Equipment sizing for a chilled liquid solution system can utilize Cooling Load Diversity. Diversity is described as the actual amount of cooling needed (heat load), by various sections of a structure at a given time. Conventional air conditioning systems are designed for the highest structure heat load. The conventional system determines and selects equipment based on the peak heat load demanded by the structure. A system sized to take advantage of diversity would determine the heat load by the time of day, building exposure, and usage. As an example the sections of a structure facing west, demand more cooling in the afternoon, than sections facing east. The opposite of this is true in the morning, where the east section is exposed to a higher head load requiring more cooling. Utilizing diversity the chiller system would adapt to the needs of each side of the structure during peak demand by delivering more cooling to that area and less to the areas that do not need it. A structure utilizing a conventional system, requiring 8 tons of cooling at peak load, could utilize a much smaller capacity system (potentially 4 or 5 tons) if the system installed could take advantage of load diversity, which would supply the necessary amount of cooling to the spaces, as and when needed instead of keeping a larger capacity available at all times.

Cooling load diversity can best be determined by referring to ACCA. (Air Conditioning Contractors of America) Manual “J”, Refer to the Appendix A-2, Multi-Zone Systems. ACCA’s Internet address is http://www.acca.org/.

Because of diversity a Multiaqua chiller can serve more total air handler tonnage, than chiller capacity. A 4-ton chiller may be delivering chilled liquid solution to 6 or more tons of air handler capacity. Because of cooling load diversity the building does not need equal amounts of cooling in each area at the same time.

ELECTRICAL AND PHYSICAL DATA

The information contained in this manual has been prepared to assist in the proper installation, operation and maintenance of the chiller. Improper installation, or installation not made in accordance with these instructions, can result in unsatisfactory operation and/or dangerous conditions, and can cause the related warranty not to apply.

Read this manual and any instructions packaged with separate equipment required to make up the system prior to installation. Retain this manual for future reference.

⚠ Failure to properly ground the chiller can result in death!

⚠ Disconnect all power wiring to chiller before maintenance or service work. Failure to do so can cause electrical shock resulting in personal injury or death.

⚠ All wiring must be done in accordance with the NEC (National Electric Code) as well as state and local codes, by qualified electrician's.

⚠ Product warranty does not cover any damage or defect to the chiller caused by the attachment or use of any components, accessories or devices (other than those authorized by the manufacturer) into, onto or in conjunction with the chiller. You should be aware that the use of unauthorized components, accessories or devices may adversely affect the operation of the chiller and may also endanger life and property. The manufacturer disclaims any responsibility for such loss or injury resulting from the use of such unauthorized components, accessories or devices.

⚠ Upon receiving chiller and components, inspect for any shipping damage. Claims for damage, either apparent or concealed should be filed immediately with the shipping company.

⚠ No liquid other than the solution of water and propylene glycol (mixed in accordance with table 6) shall be used in piping system.

⚠ Corrosive environments may subject metal parts of the chiller to rust or deteriorate. The oxidation could shorten the chiller's useful life. Corrosive elements include salt spray, fog, or mist in seacoast areas, sulfur or chlorine from lawn watering systems, and various chemical contaminant's from industries such as paper mills and petroleum refineries.

If the unit is to be installed in an area where contaminant's are likely to be a problem, special attention should be given to the equipment location and exposure.

- Avoid-having lawn sprinklers spray directly on the chiller cabinet.
- In coastal areas, locate the chiller on the side of the building away from waterfront.
- Elevating the chiller off of its slab or base enough to allow air circulation will help avoid holding water in contact with cabinet base.
- Regular maintenance will reduce the build-up of contaminant's and help protect the cabinet finish.
- In severe locations having the chiller coated with an "epoxy " or other coating formulated for air conditioning systems located in coastal areas may be necessary.

⚠ **Consult local building codes or ordinances for special installation requirements. When selecting a site to locate the chiller, consider the following:**

- A minimum clearance of 24" on the service access side, 12" for air inlets on all sides and 60" for air discharge is required.
- The chiller must be located outdoors and cannot be connected to condenser air with ductwork.
- If a concrete slab is used, do not connect slab to building foundation or structure to prevent noise transmission.
- Locate the slab at a level sufficiently above grade to prevent ground water from entering chiller cabinet.

⚠ **Regular cleaning of cabinet air filters will be necessary. The filters clean the air cooling the circulation pump.**

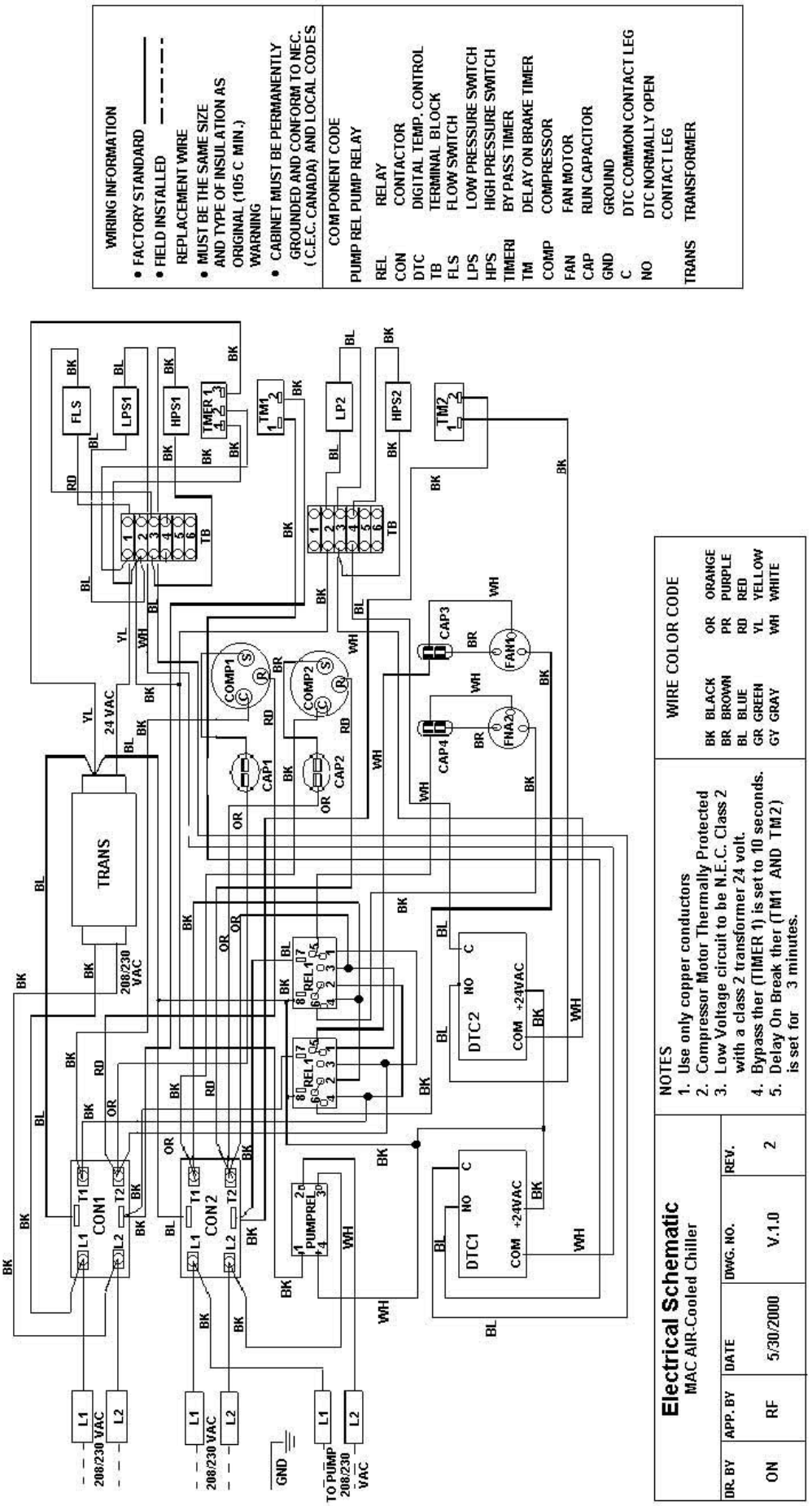
Model Number	Physical Data									
	Coil				Chiller				Weight	
	Height In [mm]	Length In [mm]	Copper Diameter In [mm]	No. Rows	Height In [mm]	Length In [mm]	Width In [mm]	R22 Oz. [G]	Net Lbs. [kg]	Shipping Lbs. [kg]
MAC-036	38 [965.2]	48 [1219.2]	3/8 [9.5]	1	49.75 [1263.65]	39.75 [1009.65]	16.25 [412.75]	88 [2494]	280 [127]	283 [128]
MAC-048	38 [965.2]	48 [1219.2]	3/8 [9.5]	2	49.75 [1263.65]	39.75 [1009.65]	16.25 [412.75]	96 [2736]	292 [132]	295 [134]
MAC-060	38 [965.2]	48 [1219.2]	3/8 [9.5]	2	49.75 [1263.65]	39.75 [1009.65]	16.25 [412.75]	96 [2736]	313 [142]	316 [143]
MAC-120	52.5 [1330]	48 [1220]	3/8 [9.5]	3	60 [1520]	58.25 [1480]	25.25 [640]	96 [2736]	650 [295.5]	700 [318]
MACH-060	38 [965.2]	48 [1219.2]	3/8 [9.5]	2	49.75 [1263.65]	39.75 [1009.65]	16.25 [412.75]	96 [2736]	323 [147]	326 [148]

Electrical Data

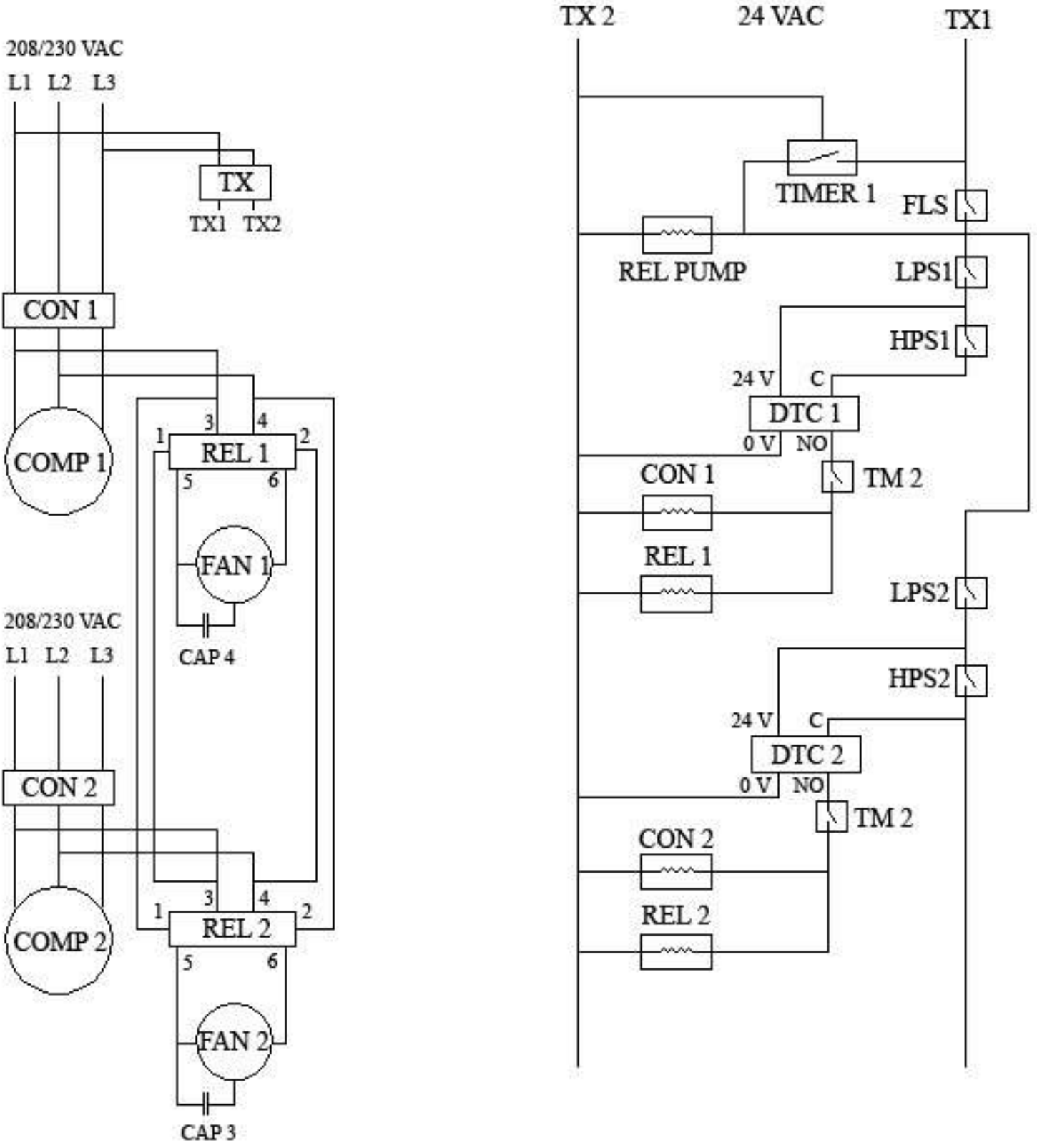
Model Number	Volts Phase Hertz	Per Compressor		Fan Motor x 2		Pump Motor Min. Circuit		Ampacity (Amperes) Per Circuit	Fuse or HACR Circuit Breaker Per Circuit	
		(RLA)	(LRA)	(FLA)	(RPM)	(FLA)	(RPM)		Min. Amps	Max. Amps
MAC-036-01	208/230-1-50/60	18.4	95	1.05	1050	3.7	3450	28.80	30	40
MAC-048-01	208/230-1-50/60	22.1	137	1.05	1050	3.7	3450	33.43	40	50
MAC-060-01	208/230-1-50/60	32.1	169	1.05	1050	3.7	3450	45.93	50	70
MAC-120-01	208/230-1-50/60	32.1	169	2.0	–	–	–	44.23	50	70
MAC-120-02	208/230-1-50/60	19.3	137	2.0	–	–	–	26.2	30	40
MAC-120-03	380/415/460-3-50/60	10	75	2.0	–	–	–	13.7	20	20
MAC-036-02	208/230-3-50/60	11.4	77	1.05	1050	3.7	3450	20.05	20	30
MAC-048-02	208/230-3-50/60	16.4	91	1.05	1050	3.7	3450	26.30	30	40
MAC-060-02	208/230-3-50/60	19.3	137	1.05	1050	3.7	3450	29.93	30	40
MACH-060-01	208/230-1-50/60	32.1	169	1.05	1050	3.7	3450	45.93	50	70
MAC-036-03	380/460-3-60	7.85	50	0.6	1050	2.85	3500	13.86	15	20
MAC-048-03	380/460-3-60	10	62	0.6	1050	2.85	3500	16.55	20	20
MAC-060-03	380/460-3-60	10	75	0.6	1050	2.85	3500	16.55	20	20

Supply Wire Length Feet	Copper Wire Size (1% Voltage Drop)								
200	6	4	4	4	3	3	2	2
150	8	6	6	4	4	4	3	3
100	10	8	8	6	6	6	4	4
50	14	12	10	10	8	8	6	6
	15	20	25	30	35	40	45	50
	Supply Circuit Ampacity							

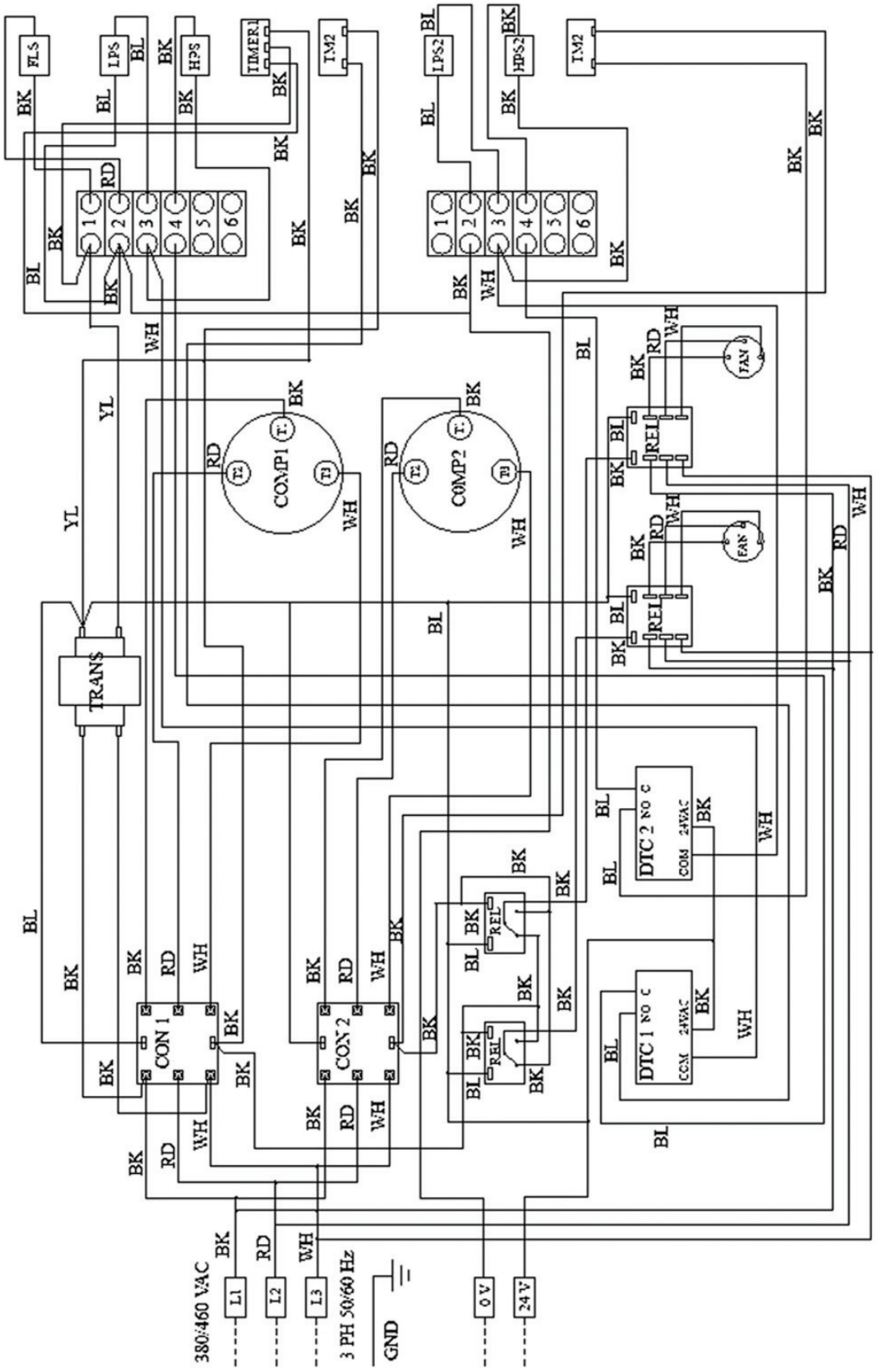
MAC-120 Single Phase 208/230 VAC



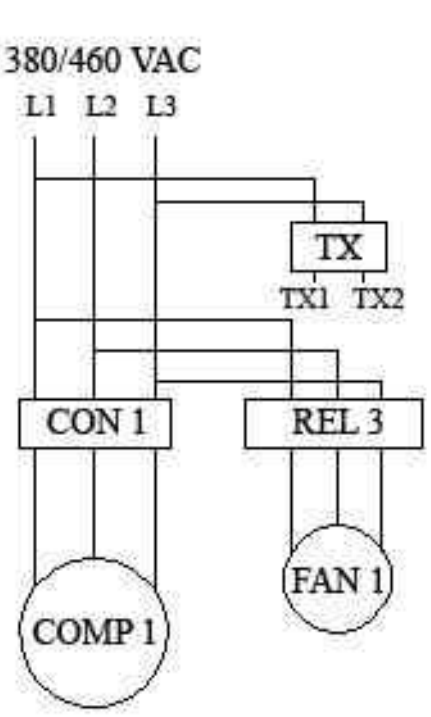
MAC-120 3 Phase 208/230 Ladder Wiring Diagram

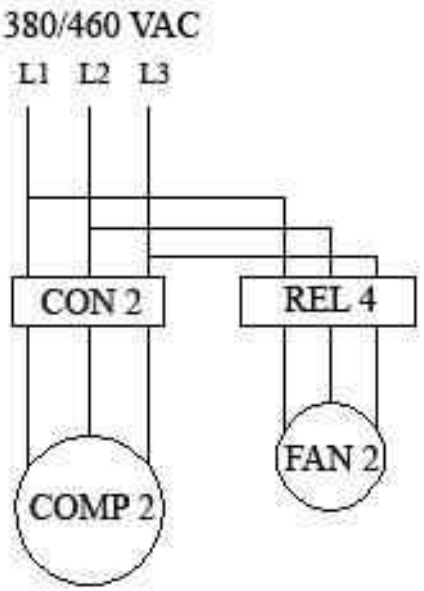


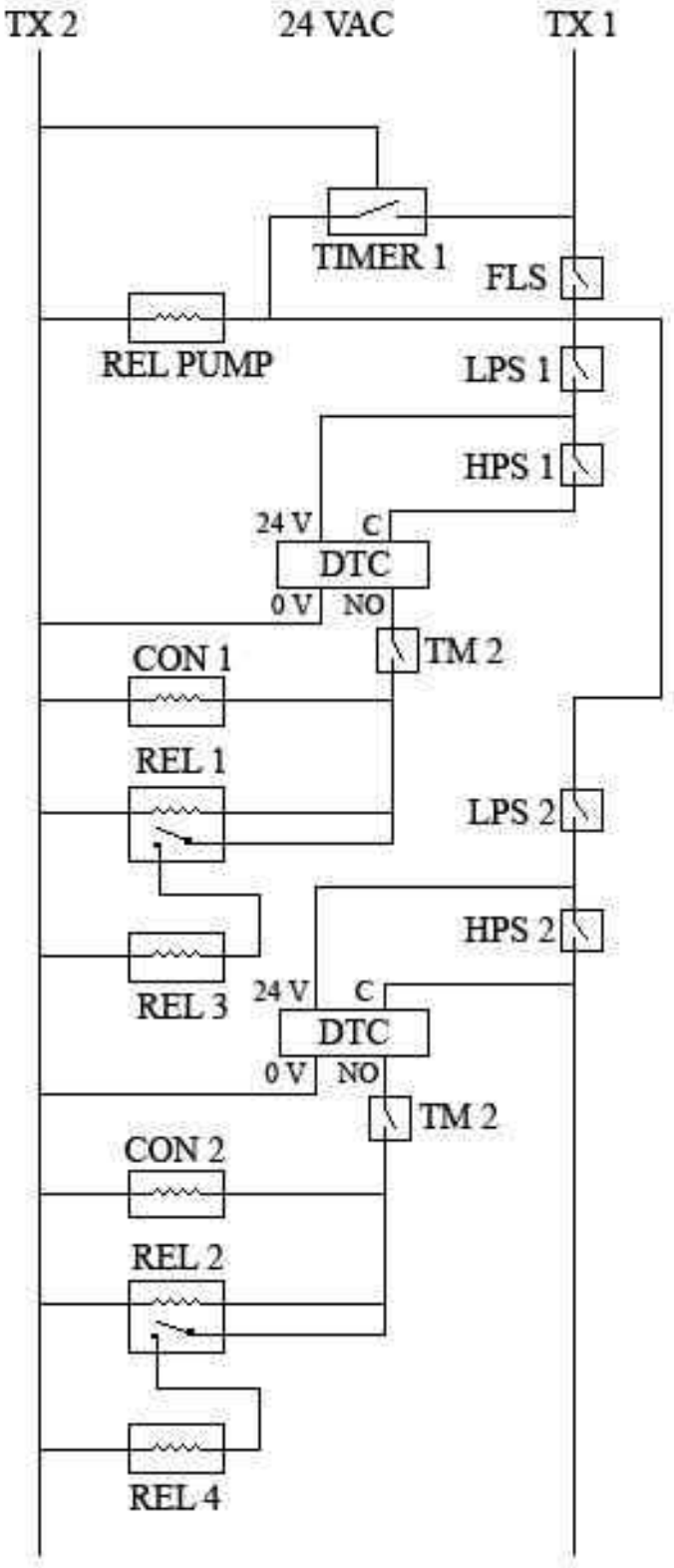
Electrical Schematic
MAC-120 3 Phase 380/460 VAC



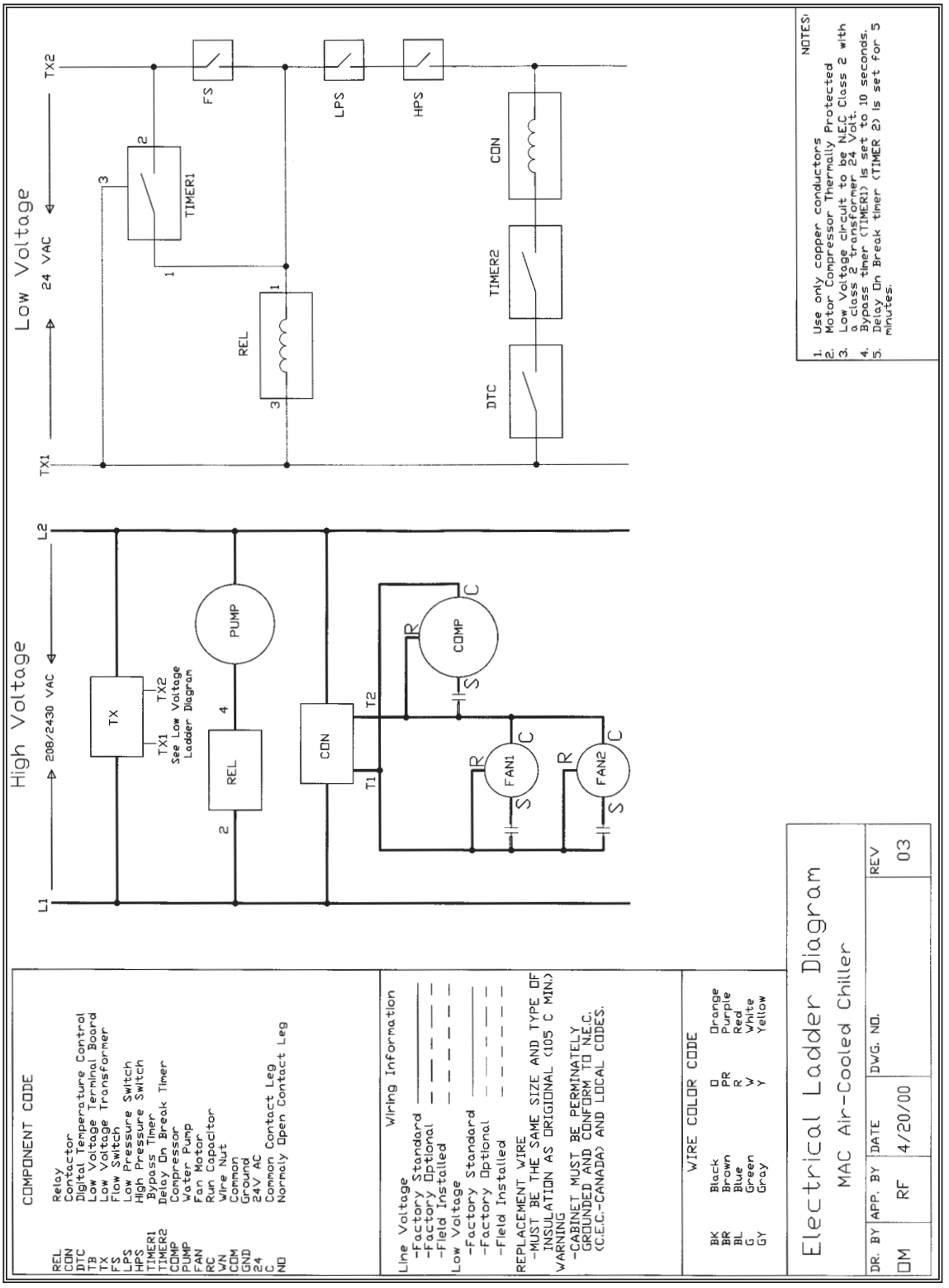
MAC-120 3 Phase 380/460 Ladder Wiring Diagram



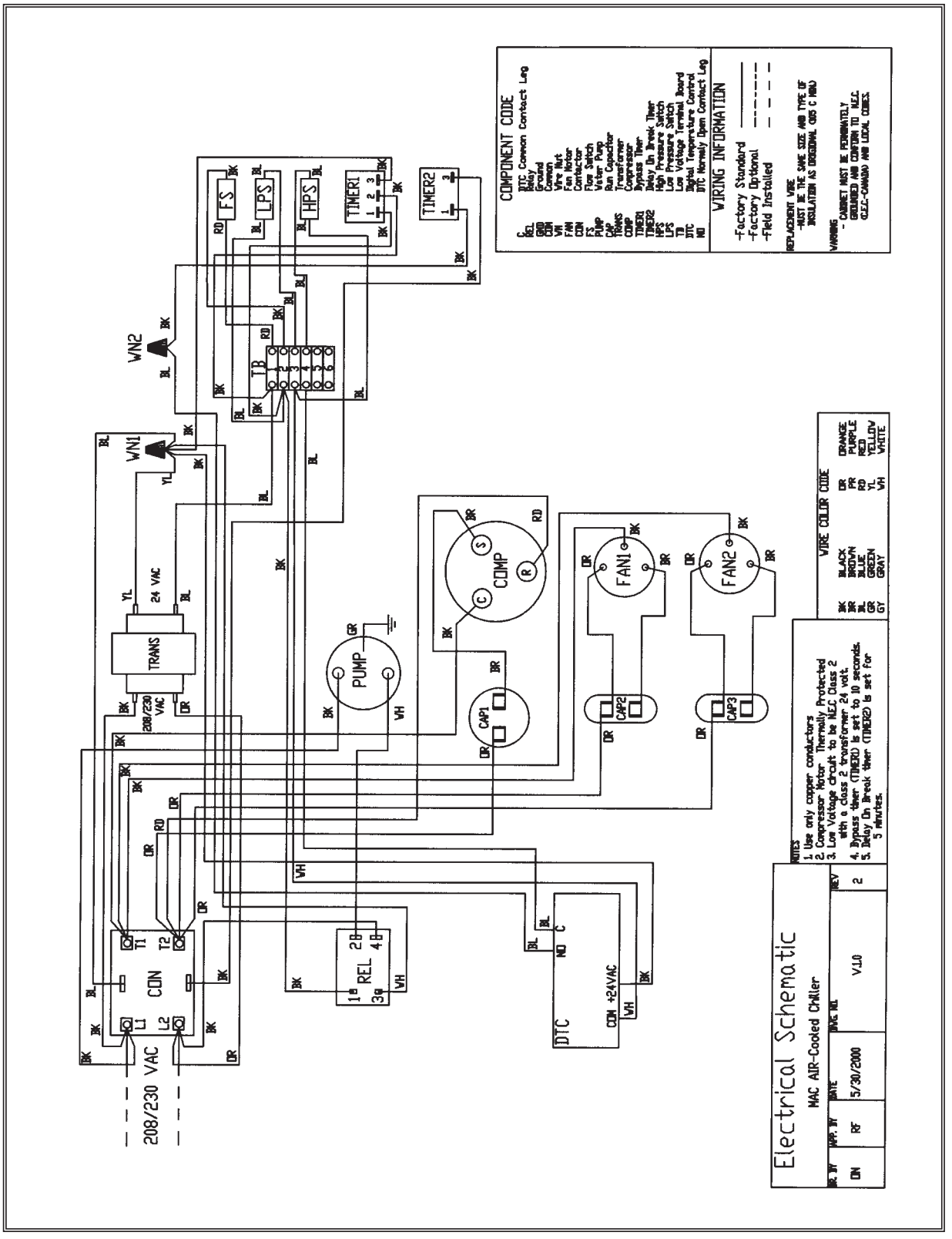




Multiaqua Ladder Wiring Diagram
MAC036, MAC048, MAC060



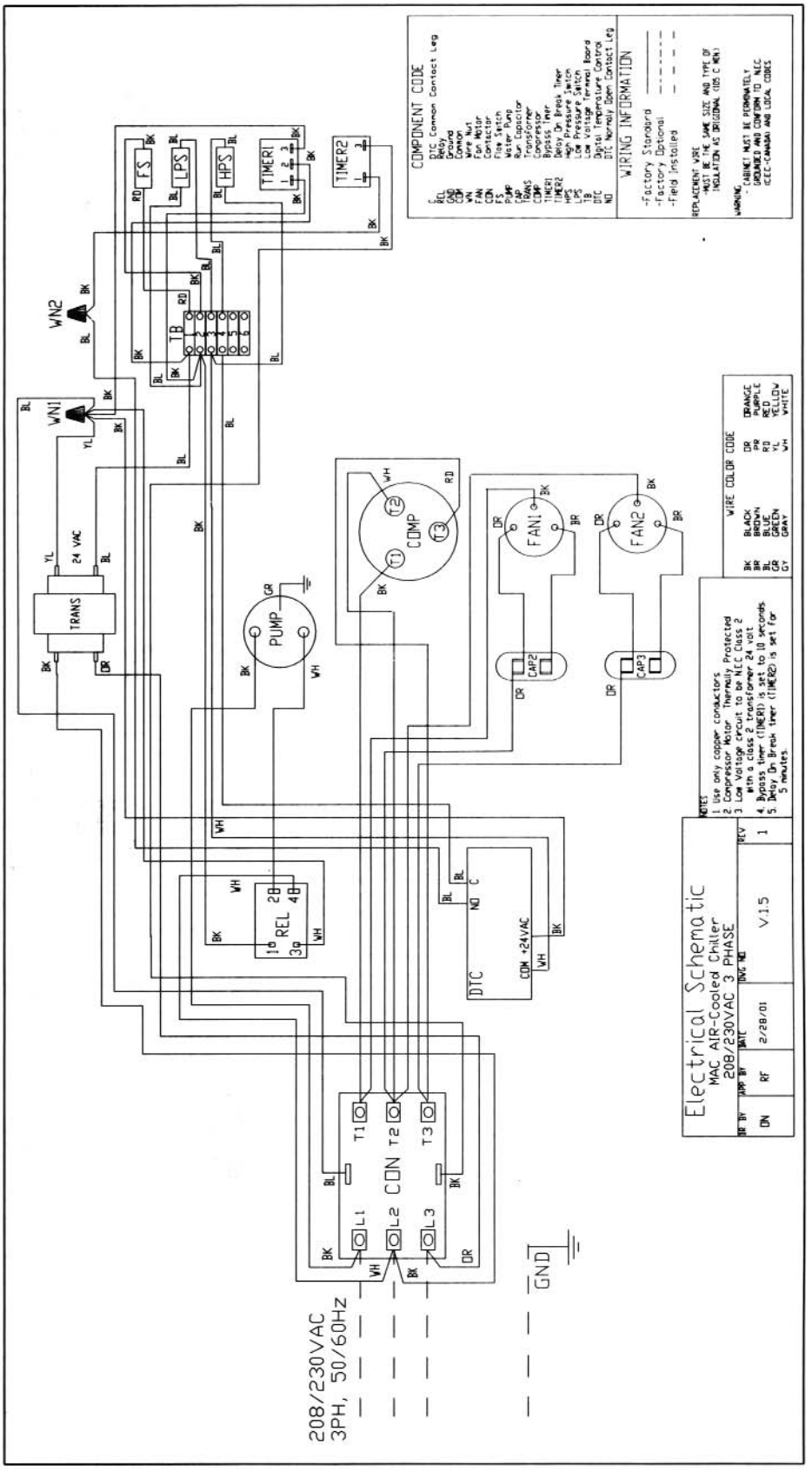
Multiaqua Pictorial Wiring Diagram
Single Phase 208/230 Vac
MAC036, MAC048, MAC060



Electrical Schematic

3 Phase 208/230 VAC

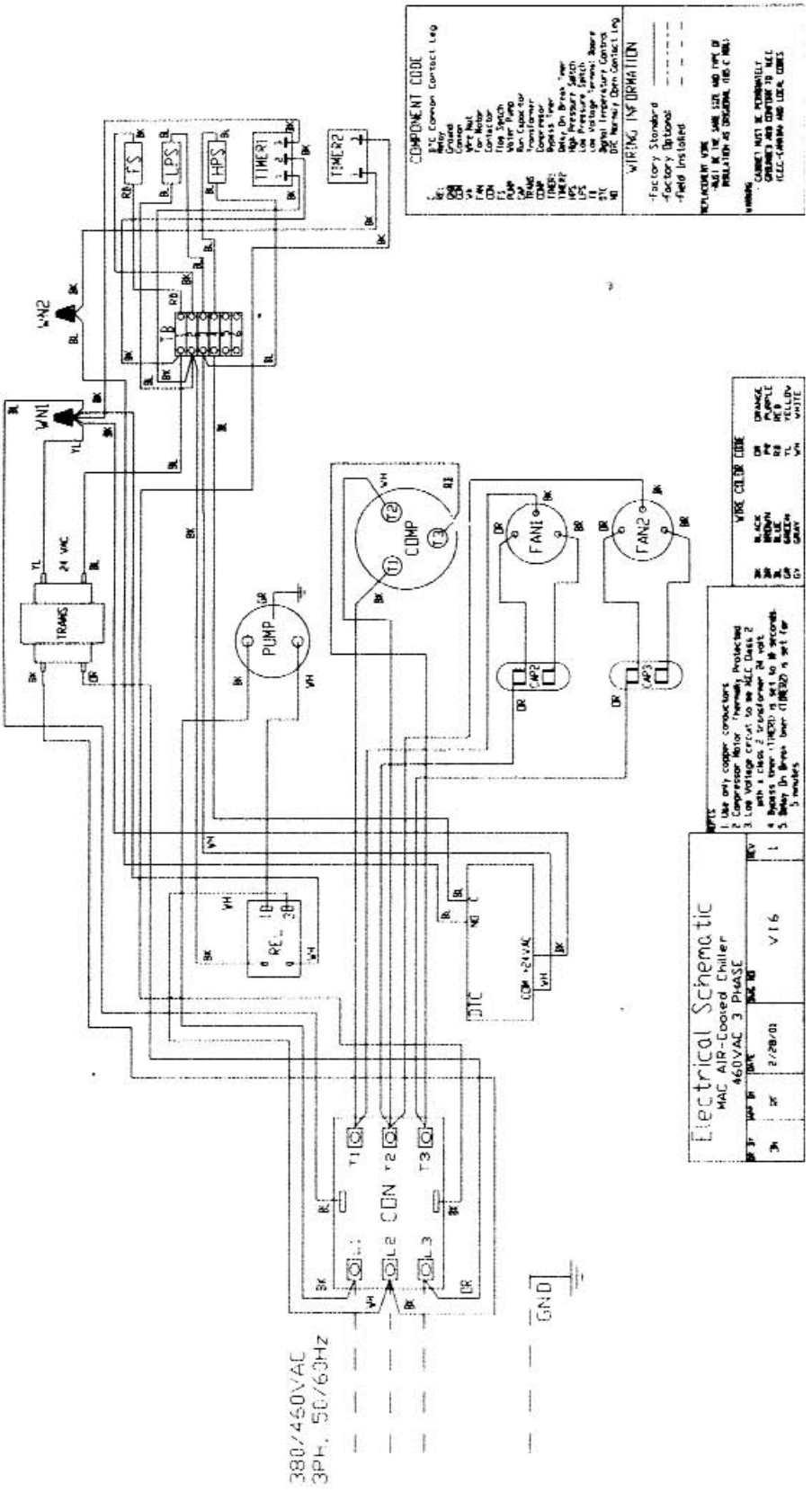
MAC036, MAC048, MAC060



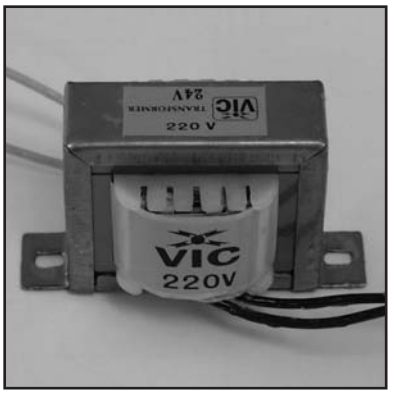
Electrical Schematic

3 Phase 380/460 VAC

MAC036, MAC048, MAC060



Description of Electrical Controls



Control Transformer: The control transformer is rated at 24 volt, 40 volt/amp (1.6 amps @ 24 volts).

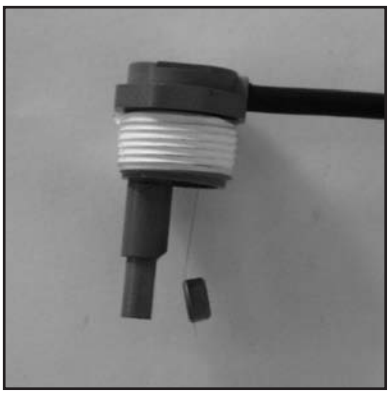
Pump Bypass Timer: The pump bypass timer is a 24- volt, 3-wire control. When energized the timer will bypass the flow switch for 10 seconds (by creating a circuit to the pump relay), energizing the pump relay, allowing the pump to operate long enough to close the flow switch. In a normally operating system the flow switch will stay closed powering the pump relay in series with the low and high-pressure switches. Should flow switch open, the timer can only be reset by opening and closing the chiller, line voltage disconnect.

Refrigerant System Timer: The refrigerant timer is a 24-volt, 5-minute delay on break, 2-wire timer. The normally closed contacts of the timer energize the compressor contactor through the chilled solution control. When the chilled solution control contacts open the timer delays by opening its contacts for 5 minutes before resetting to the closed position.

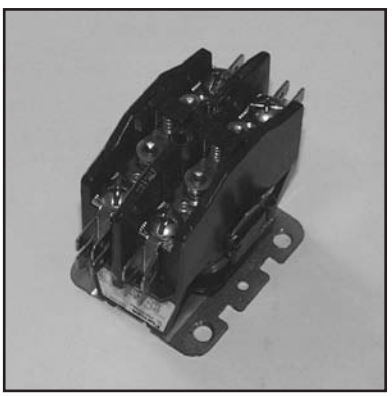
High Pressure Switch: The high-pressure switch is an automatic reset control that senses compressor discharge line pressure. It opens at 400 PSIG and closes at 300 PSIG.

Description of Electrical Controls (cont.)

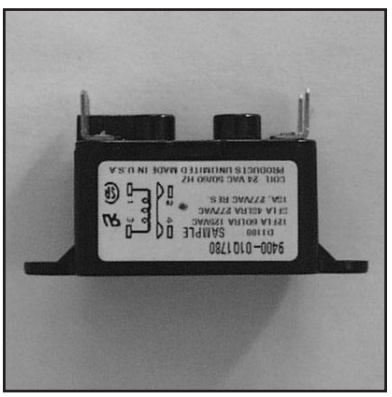
Low Pressure Switch: The low-pressure switch is an automatic reset control that senses compressor suction line pressure. It opens at 40 PSIG and closes at 80 PSIG.



Flow Switch: The flow switch senses liquid solution flow. The paddle of the switch is inserted through a fitting into the pump discharge line. Liquid solution flow deflects the paddle closing the flow switch. The flow switch is position sensitive. The arrow ⇧ on the switch must point in the direction of liquid solution flow.



Compressor Contactor: The compressor contactor energizes the compressor through the two normally open contacts. The contactor coil operates (closes the contacts) when energized by 24 volts.



Pump Relay: The pump relay energizes the pump through a normally open contact. The pump relay coil operates (closes the contact) when energized by 24 volts.

Description of Electrical Controls (cont.)

Liquid solution Temperature Control: The liquid solution temperature control is an adjustable microprocessor based temperature control, receiving temperature information from a thermistor located on the liquid solution supply line. A liquid crystal display continuously indicates liquid solution temperature. The control is mounted inside the chiller cabinet.

Chiller Controls Sequence of Operation

When powered up the Multiaqua Chiller System energizes the control system transformer (208-240 volts), creating 24-volt control voltage.

First the pump bypass timer is energized and temporarily bypasses the flow switch energizing the pump relay. The pump then starts to move liquid solution through the piping system (in a properly filled and air purged system). The movement of liquid solution from the pump discharge keeps the flow switch closed. After a 10 second delay the pump timer contact opens, connecting the flow switch in series with the high and low-pressure switches. The pump will now run continuously unless the power supply is interrupted or the flow switch opens.

If the liquid solution temperature controller is calling for cooling the control circuit is routed through the short cycle timer, and the three safety switches (the flow, low and high pressure switches) to the compressor contactor. This will energize the compressor and condenser fan motors. The liquid solution controller will open at the user programmed set point, causing the refrigerant short cycle timer to open it's contact for 5 minutes as it delays before resetting to the closed position. This will de-energize the compressor and condenser fan motors. Power fluctuations will also initiate a 5-minute time delay. The 5-minute delay allows the refrigerant system a period for pressure equalization, protecting the compressor from short cycling.

The chiller temperature controller utilizes a thermistor to monitor the liquid solution temperature change. The temperature is then compared to the set point and differential temperatures, programmed into the control by the user. The set point is the liquid solution temperature, which will cause the control switch to open. For example the control set point is programmed at 44ºF LWT degrees with a 10ºF differential, which opens the controller at 44ºF LWT, and closes it at 54ºF. The differential temperature is the number of degrees above set point temperature programmed into the controller. If liquid solution temperature is at the set point plus differential the controller cycles the compressor and fan motors on. When liquid solution temperature falls to the set point the controller cycles the compressor off.

⚠ **Chillers are shipped with the control set point adjusted to 44ºF LWT and 10ºF differential. Liquid solution temperature set point should not be set below 40ºF.**

SYSTEM FAULTS:

Flow Switch Opening: The flow switch is normally closed during pump operation. Should liquid solution flow be interrupted for any reason the control will open, shutting down and locking out chiller operation. The only exception to this is when power is first applied to the chiller, and the pump bypass timer bypasses the flow switch for 10 seconds.

⚠ When the system is first filled with liquid solution and the pump started, expect the system to cycle off on the flow switch, until all of the air is removed from the piping system. The system will have to be reset by opening and then closing the disconnect switch or circuit breaker powering the chiller.

Low Pressure Switch Opening: Should the compressor suction pressure go low enough (40 psi) to open the low-pressure switch, the compressor and condenser fan motors will shut down. Check for a refrigerant leak, inoperative thermostatic expansion valve, low liquid solution control setting, low ambient operation, low liquid solution flow, etc.

High Pressure Switch Opening: Should the compressor discharge pressure go high enough to open the high-pressure switch the compressor and condenser fan motors will shut down. Check for a dirty condenser coil, inoperable fan motors/s or the re- circulation of condenser air.

Refrigeration System Operation

The refrigerant system is a closed loop consisting of a compressor, heat exchanger (evaporator), metering device (thermostatic expansion valve), and condenser coil. The refrigerant circulated is R-22. Hot gas is pumped from the compressor to condenser coil where the two condenser fans pull cooler air across the coil condensing and sub cool the refrigerant. The now liquid refrigerant flows through the liquid line to the thermostatic expansion valve, where the refrigerant pressure drops., causing the refrigerant to boil at a much lower temperature (34-40ºF). The refrigerant leaves the expansion valve and swirls through the plates of the heat exchanger, absorbing heat from the circulating liquid solution.

The evaporator or heat exchanger is designed to operate with an 8 - 10ºF superheat. The condenser is designed to condense the refrigerant and sub cools it to 12ºF below condensing temperature.

Description of Refrigerant Components

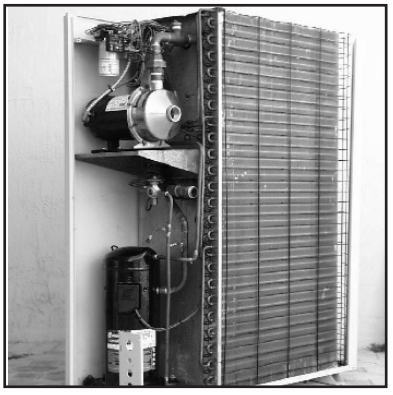
Scroll Compressor: All Multiaqua chillers feature Scroll compressors. Scroll technology ensures reliable high efficiency performance at a low sound level over a wide range of operating conditions.

⚠ Caution the top half of the scroll compressor operates at a temperature high enough to cause serious injury.

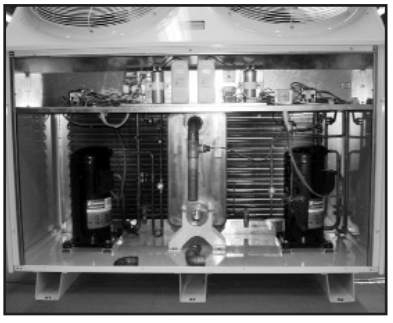
Description of Refrigerant Components (cont.)

Brazed Plate Heat Exchanger: The “Heat Exchanger” or evaporator is made of brazed copper and stainless steel plate design. Refrigerant and liquid solution is channeled through narrow openings between plates, and flow in opposite directions. The counter flow design and fluid turbulence, ensures maximum heat exchange, at minimal pressure drop.

Thermostatic Expansion Valve: Multiaqua chillers are equipped with Thermostatic Expansion Valves. The valves feature a liquid charged sensing bulb for consistent superheat at various load conditions.



3,4 & 5 Ton Condenser Coil: The air-cooled condenser coil is of copper tube, aluminum fin construction.



10 Ton Chiller: 2 - 5 ton Circuits.

Piping System Components

Supply Storage Tank: The Supply Storage Tank must be used in systems with less than 25 gallons of liquid solution. The tank prevents rapid cycling of the compressor and acts as a reservoir for chilled liquid solution.

⚠ **Supply storage tank must be insulated.**

Part#WX202H

Expansion Tank and Air Scoop: The Expansion Tank and Air Scoop assembly is used to compensate for the expansion and contraction of liquid in the system. The air scoop eliminates air entrained in the liquid solution.

Part# 1500/1”

Liquid Solution Bypass Valve: The liquid solution bypass valve relieves system pressure from the supply to the return, as system air handler control valves are cycled off.

Part #
D146M1032 - 3/4”
D146M1040 - 1 1/4”

Piping System Components (cont.)

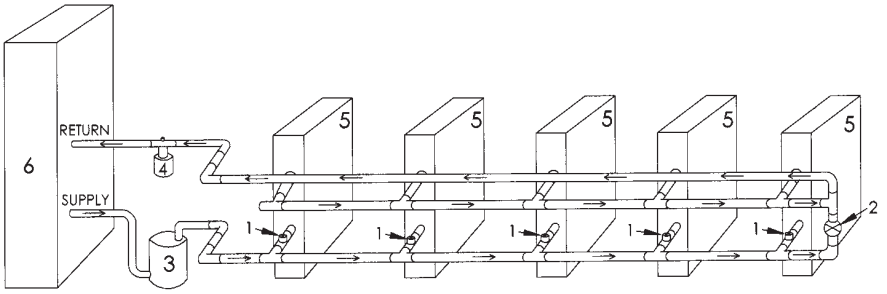
Motorized Valve: The air handler motorized valve controls the flow of liquid solution to the system air handlers. Each air handler in the system should have a motorized or solenoid valve.

Part#
MZV 524 - 1/2” 2 way
MZV 525 - 3/4” 2 way
MZV 526 - 1” 2 way

Y-Strainer: A Y-Strainer is supplied with each chiller, and should be mounted in the return line and as close to the chiller as possible.

Composite Piping Layout and Design

Understanding the function and friction loss of each part of the piping system is important to the layout and successful installation of a chilled liquid solution system.



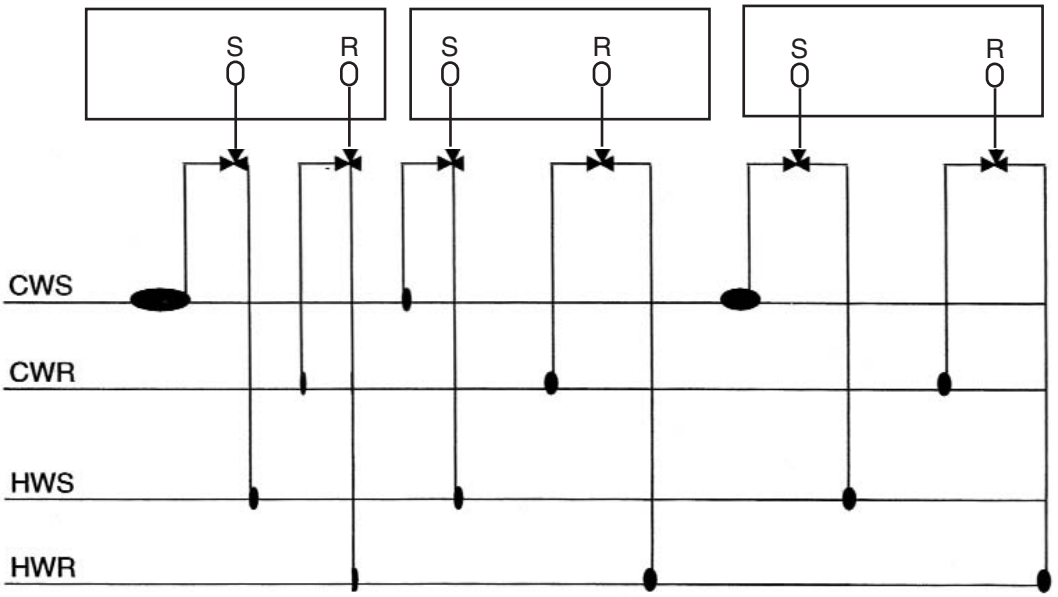
1 - 2 Way Water Control Valves
2 - Bypass Valve
3 - Storage Tank
4 - Expansion Tank
5 - Coil
6 - Chiller

Drawing 1 (based on Composite pipe, Table 2)

The circulation pump is the key performer in the piping system. The pump must circulate the liquid solution through the heat exchanger, and piping system to the air handlers. Pumps are designed to deliver a flow rate measured in gallons per minute (GPM). The pump must be able to overcome the resistance to flow (pressure drop), imposed by the chiller components, piping system, and air handlers, while maintaining the necessary flow rate in gallons per minute (GPM). Pump capacities in gallons per minute, and pressure drop (feet of head) are listed in Table 1.

⚠ An adjustable valve must be used to throttle the discharge liquid solution flow rate to appropriate levels based on capacity and glycol mix percentage.

Heating & cooling sample piping configuration for connecting 2 pipe fancoil to 4 pipe Heat Cool System



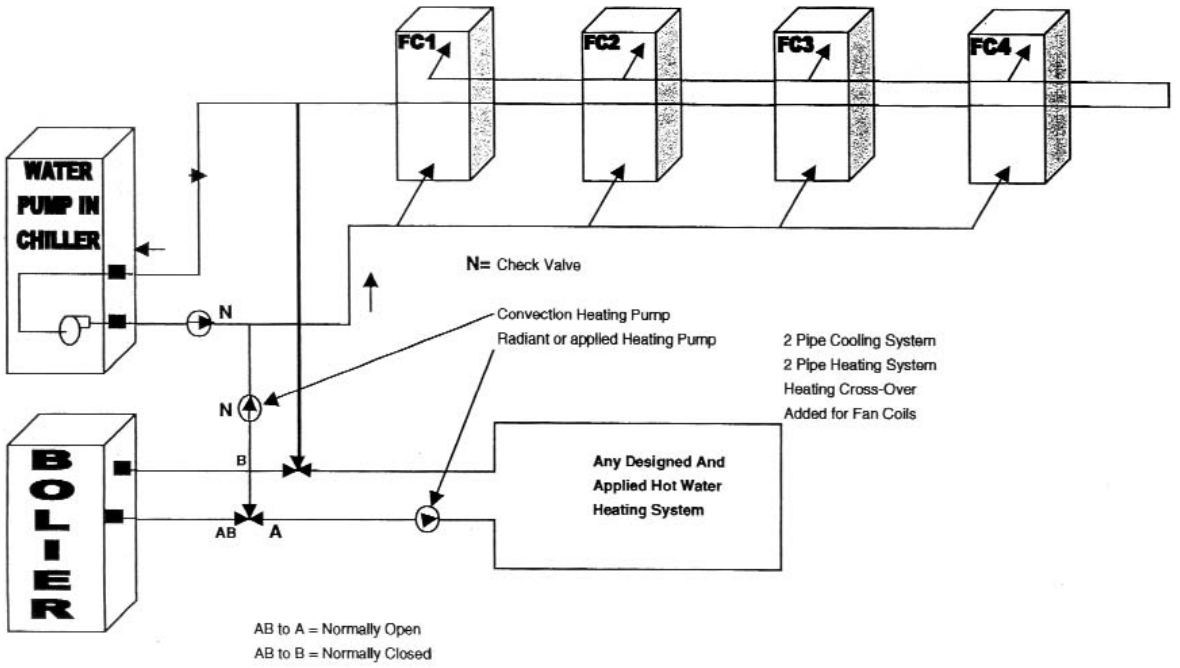
2 PIPE FANCOIL (BENEFITS)

1) Cost is Lower
2) Much Quieter
3) Less Weight

(DRAW BACKS)

1) One additional 3 way valve required per Fancoil
2) Manual Switching between Heat and Cool required.

Sample piping configuration for connecting 2 pipe fancoil to 4 pipe Heat Cool System



Chiller System Data

Table1

MAC Series		MAC036	MAC048	MAC060	MACH060	MAC-120
Min. Liquid Solution Flow Rate	GPM	5	6.5	9	9	18
Max. Pressure Available	Ft. of Head	50				
Max. Liquid Flow Rate	GPM	8.6	11.5	14.4	14.4	28.8
Min. Liquid Solution Content in System	U.S. Gal	25				50
Expansion Tank Size*	U.S. Gal	2				3% of Tot.
Internal chiller pressure loss	Ft. of Head	1.77	1.68	1.85	1.85	1.85
Chiller Liquid Solution Content	U.S. Gal	**1.1**	**1.3**	**1.5**	**1.5**	**1.5**

Piping resistance or pressure drop is measured in feet of head. A foot of head is the amount of pressure drop imposed in lifting liquid solution one foot. Pumps in the Multiaqua system are designed to move rated liquid solution flow (see table 1) in GPMs, against a total friction loss of fifty feet of head. This would be the friction imposed in lifting liquid solution fifty feet. Fifty feet of head is equivalent to 21.65PSI pressure drop.

Composite Pipe Performance Data

Head Loss (psi/100ft. Composite Pipe vs. Flow Rate (U.S. GPM)

Table 2

Flow Rate U.S. GPM	1/2"		3/4"		1"	
	Head Loss 100'	Velocity Ft./s	Head Loss 100'	Velocity Ft./s	Head Loss 100'	Velocity Ft./s
0.1	0.02	0.018	0.002	0.07	0.001	0.04
0.2	0.09	0.37	0.01	0.13	0.002	0.08
0.3	0.18	0.55	0.02	0.2	0.005	0.13
0.4	0.31	0.74	0.03	0.26	0.009	0.17
0.5	0.46	0.92	0.04	0.33	0.01	0.21
0.6	0.65	1.1	0.05	0.39	0.02	0.25
0.7	0.87	1.3	0.07	0.46	0.02	0.3
0.8	1.11	1.5	0.09	0.52	0.03	0.34
0.9	1.38	1.7	0.1	0.59	0.04	0.38
1	1.6	1.8	0.1	0.7	0.05	0.42
2	5.9	3.7	0.5	1.3	0.2	0.85
3	12.5	5.5	1	2	0.4	1.3
4	21.3	7.3	1.8	2.6	0.6	1.7
5	32.2	9.2	2.7	3.3	0.9	2.1
6	45.1	11	3.8	4	1.3	2.5
7	60	12.8	5	4.6	1.7	3
8			6.4	5.3	2.2	3.4
9			8	5.9	2.7	3.8
10			9.7	6.6	3.3	4.2
11			11.6	7.2	3.9	4.6
12			13.6	7.9	4.6	5

Pipe Fitting Performance Data

Fitting Loss in Equivalent Feet of Straight Pipe

Table 3

Size of Pipe	Male Adapters *(forward)	Male Adapters **(reverse)	90 Deg. Elbow	Tee Run	Tee Branch	Copper Adapter
in mm	Ft. (m)	Ft. (m)	Ft. (m)	Ft. (m)	Ft. (m)	Ft. (m)
1/2 (12)	2.0 (.6)	3.0 (.91)	7.5 (2.3)	2.5 (.67)	8.0 (2.4)	2.0 (.6)
3/4 (20)	2.0 (.6)	3.0 (.91)	8.5 (2.6)	2.5 (.67)	10.5 (3.2)	1.5 (.46)
1 (25)	2.0 (.6)	3.0 (.91)	9.0 (2.7)	2.5 (.67)	11.0 (3.4)	1.5 (.46)
* Forward flow directions: standard schedule composite pipe to Kitec.						
** Reverse flow direction: Kitec to standard schedule composite pipe.						

Multiaqua Air Handler Pipe Performance Data

Multiaqua CFFWA Air Handler Flow Rates, Pressure Drops, and Supply Pipe Sizing *

Table 4

Capacity (tons) CFFW	Flow (GPM) CFFW	P.D. ft./head CFFW
0.5	1.2	3
0.75	1.8	3
1	2.4	5
1.5	**3.6**	**6**
2	4.8	14
3	7.2	23
4	9.6	26
5	12	18

Piping System Pressure Drop Calculations:

Each part of a chilled liquid solution piping system imposes a measurable amount of pressure drop measured in feet of head.

- **Table 1** determines the pressure drop imposed by the chiller, which includes the heat exchanger, strainer, and internal pipe and fittings.
- **Table 2** provides pipe pressure drop (listed in feet of head per 100').
- **Table 3** refers to fitting pressure drops (listed in equivalent feet of straight pipe),
- **Tables 4**, air handler pressure drops (feet of head)

Calculating Pipe Fitting Pressure Drop:

Pressure drops for pipe fittings are expressed in equivalent feet of straight pipe. To determine the pressure drop for a 1" Composite pipe elbow, flowing 12 gallons per minute (GPM) you would refer to Table 3, and determine that it has a pressure drop that is equivalent to 9 feet of 1" pipe. At a 12-GPM-liquid solution flow, the 1" elbow's pressure drop in feet of head can be determined by referring to Tables 3 and 2 as follows:

Table 3 indicates that the 1" elbow is equivalent to 9' of straight pipe, which we will need for a fitting pressure drop calculation.

Table 2 indicates that the pipe pressure drop for 1" pipe at 12 GPM is 4.6 feet of head for a hundred feet of pipe.

Since our 1" elbow is the equivalent to 9' of pipe, and the Table 2 information is for 100 ' of pipe we need to calculate the pressure drop per foot of pipe. We will divide 4.6 the pressure drop for 100' of pipe by 100, which will give us the pressure drop per foot of pipe.

$$4.6 \div 100 = .046$$

Each foot of 1" pipe flowing 12 GPM has a pressure drop of 0.46 feet of head.

Since we have 9 equivalent feet of pipe we need to multiply our 9 feet times the pressure drop per foot of .046 feet of head.

$$9' \text{ X } .046 = .414 \text{ feet of head}$$

Our 1" elbow (flowing 12 GPM) has a pressure drop across it of .414 feet of head.

You can use the above calculation anytime pressure drop information is listed in equivalent feet of straight pipe.

Piping System Total Pressure Drop:

The pressure drop for an entire piping system can be calculated by totaling the following pressure drops:

- Fitting pressure Drops
- Piping Pressure Drops
- Chiller Pressure Drops
- Air Handler Pressure Drops
- Component Pressure Drops (valves etc.)
- Total Pressure Drop for Piping System

Since calculating and totaling pressure drops is time consuming we recommend the simpler Rule of Thumb method explained below.

Rule of Thumb Procedure for Pipe System Layout

The rule of thumb method is easy to use, saves time and insures proper pipe sizing and layout. Instead of calculating and totaling the pressure drops for the pipe, individual fittings, and piping components you measure the length of installed pipe. The total length of installed pipe is then multiplied by 150% (example: 120 feet of installed pipe x 150% = 180 equivalent feet of pipe). This gives you 50% allowance for the pressure drops of fittings, chiller piping headers, system components, and short piping runs to the air handlers from the chilled liquid solution main*.

**Drawing one is an example of a Composite piping system using a chilled liquid solution main.*

The purpose of calculating system pressure drop is to determine if the proposed, or existing piping layout will allow the chiller pump to deliver the required amount of liquid solution from the chiller to the air handlers. Should the proposed or existing system have a pressure drop that exceeds the pumps capacity (refer to Table 1), a recalculation of pressure drop with larger pipe, fewer fittings, or other system alterations will be required.

Pump Capacity vs. Piping System Pressure Drop

All Multiaqua Chillers have a pump capable of moving maximum liquid solution flow at 50 feet of head. To determine if our proposed piping system will deliver the correct amount of liquid solution the total pressure drop for the system must be determined. To make this determination we need the following:

Chiller/Heat Exchanger Pressure Drop	Table 1
Air Handler Pressure Drop	Table 4
Pipe Pressure Drop	Table 2
Installed Length of Pipe	Measured

Example 1:

Installation Information:

- 170’ of installed 1” pipe
- 12 GPM flow rate (5 ton chiller)
- 1.85 ft./head Chiller/Heat Exchanger pressure drop
- 16.25 foot of head pressure drop for 2 ton air handler (Table 4)*

Calculations:

170' of pipe times 150%		= 255 equivalent feet of pipe
225' ÷ 100		= 2.25 increments of 100' pipe pressure drop
4.6		Foot of Head Loss per 100' of pipe (Table 2)
4.6 X 2.25	=10.35	Head Loss for Piping System
	1.8	Chiller/Heat Exchanger pressure drop
	16.25	Air Handler/Valve pressure drop

10.35 + 1.8 +16.25 = 38.75 Total head loss for proposed system layout
(Air handler and piping system)

The calculated 38.75-foot of system head is within the pumps 50 ft./head rating, and the system should deliver required liquid solution flow.

**Only one air handler needs to be accounted for, as the system is piped in parallel. You must use the air handler in the system with the greatest pressure drop (ft./head) in the calculation of total head. Systems pumping to different elevations are handled the same as a system with the chiller, and air handlers on the same level.*

Example 2:

Installation Information:

- 60' of installed 1" Composite pipe
- 9.6 GPM flow rate (4 ton chiller)
- 1.68 ft./head Chiller/Heat Exchanger pressure drop
- 28 foot of head pressure drop for 4 ton air handler (Table 4)*

Calculations:

60' of pipe times 150%		= 90 equivalent feet of pipe
90' ÷ 100		= 0.9 increments of 100' pipe pressure drop
3.3		Foot of Head Loss per 100' of pipe (Table 2)
3.3 X 0.90	= 2.97	Head Loss for Piping System
	28.00	Air Handler/Valve pressure drop
	1.8	Chiller/Heat Exchanger pressure drop
2.97 + 28* + 1.8	= 32.77	Total head loss for proposed system layout

(Air handler and piping system)

**Only one air handler needs to be accounted for, as the system is piped in parallel. You must use the air handler in the system with the greatest pressure drop (ft./head) in the calculation of total head. Systems pumping to different elevations are handled the same as a system with the chiller, and air handlers on the same level.*

Drawing 2 Piping System Layout Example: 3/4" pipe size

Using Drawing 2 as the system to be installed, we assume a 5 ton 12 GPM chiller with four 2 ton air handlers (4.8 GPM for each air handler per Table 4), and 3/4" pipe size. Structure diversity* allows for the 8 tons of air handlers. We now total up the installed system piping length, plus our 50% fitting allowance, and determine the piping pressure loss in feet of head (use Table 2.) To the pipe pressure drop we add the chiller and air handler pressure drops (Tables 1 and 4) to get the total system pressure drop, which we compare to the pump head of 50' (Table 1).

- 275' 3/4" Composite Pipe
- 138' (50% fitting, header and accessory allowance)
- 413' Total Equivalent feet of installed pipe * (275' x 150%)

413' ÷ 100 x 13.6 (13.6 is Table 2*pressure drop for 100' of pipe) = 4.13* x 13.6 = 56.17 feet of pipe system pressure drop.

** Table 2 lists the pressure loss in 100' of Composite™ Pipe. You have the equivalent length of 413' of pipe, making it necessary to divide by 100 to get the number of 100' increments to multiply by. (413 ÷ 100)= 4.13 (4.13 increments X 13.6 feet of head per increment) = 56.17 feet of head pressure drop 413 equivalent feet of piping.*

- 56.17’ pipe head loss (3/4” pipe size)
- 1.85’ head loss for chiller (Table 1)
- 16.25’ head loss for 2 ton air handler (Table 4) *
- 74.27’ total system head loss

**Only one air handler needs to be accounted for, as the system is piped in parallel. You must use the air handler in the system with the greatest pressure drop (ft./head) in the calculation of total head. Systems pumping to different elevations are handled the same as a system with the chiller, and air handlers on the same level.*

In the example the pressure drop of 74.27 feet of head exceeds the capability of our pump 50 feet of head rating (Table 1). ?” pipe imposes too much pressure drop. Recalculation with 1” pipe is necessary.

Recalculation with 1” Composite Pipe:

- 275’ 1” Composite Pipe
- 138’ (50% fitting, header and accessory allowance)
- 413’ Total Equivalent Length of pipe * (275’ x 150%)

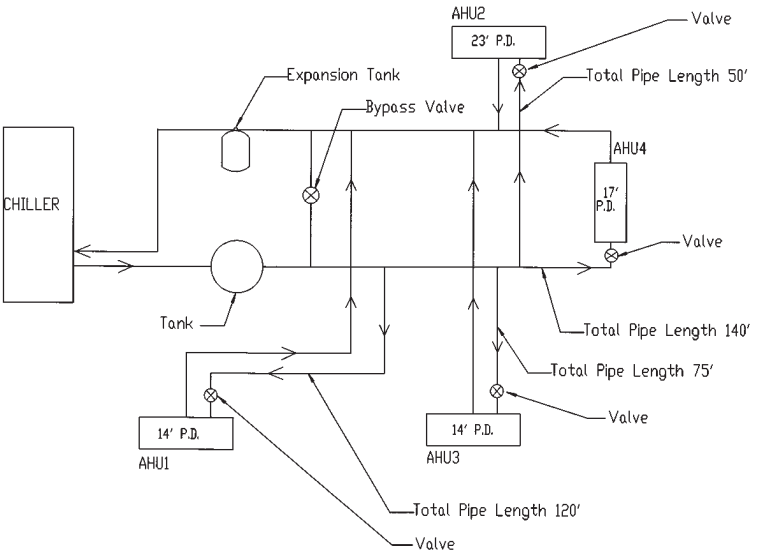
413’ ÷ 100 x 4.6 (4.6 is Table 2 pressure drop for 100’ of pipe) = 4.13* x 4.6 = 19 feet of pipe pressure drop

** Table 2 lists the pressure loss in 100’ of Composite Pipe. You have the equivalent length of 413’ of pipe, making it necessary to divide by 100 to get the number of 100’ increments to multiply by. (413 ÷ 100)= 4.13 (4.13 increments X 13.6 feet of head per increment) = 56.17 feet of head pressure drop 413 equivalent feet of piping.*

- 19.00’ pipe head loss
- 1.85’ head loss for chiller (Table 1)
- 16.25’ head loss for 2 ton air handler (Table 4) *
- 37.10 total head loss

The total head loss of 37.10 feet of head is within the pumps 50 ft./head rating and should deliver adequate liquid solution flow.

Drawing 2 (based on Composite pipe, Table 2)



Drawing 2 above is an example of a piping layout made up of multiple individual liquid solution circuits. With this type of layout you must be certain which circuit has the greatest pressure drop (ft./head). If you can supply the required liquid solution to the greatest pressure drop circuit in the system, the shorter circuits will have sufficient liquid solution, as their pressure drops are less.

Determine total pressure drop for each of four air handler unit (AH) as follows:

- AH1 (2 ton @ 4.8 GPM)
- 120’ of 3/4” Composite pipe
- 60’ (50% allowance for fittings and headers)
- 180’ Total* Equivalent Length of pipe (120’ x 150%)

180 ÷ 100 x 2.7 (2.7 is the Table 2 pressure drop for 100’ 3/4” of pipe @ 4.8 GPM)
= 1.8* x 2.7 = 4.86 feet of pipe pressure drop

**Table 2 lists the pressure loss in 100’ of Composite Pipe. You have the equivalent of 180’ of pipe, making it necessary to divide the total equivalent length of pipe by 100 to get the total pressure drop for the installation. (180 ÷ 100) = 1.8.*

Total pressure drop for Air Handler 1:

Air Handler 1 (2 ton size, Table 4) pressure loss	16.25’ of head
5 ton chiller loss in feet of head (Table 1)	1.85’ of head
Pipe pressure loss	4.86’ of head
Total pressure drop for AH 1	22.96’ head

- AH2 (3 ton @ 7.2 GPM)
- 50’ of 3/4” Composite pipe
- 25’ (50% allowance for fittings and headers)
- 75’ Total * Equivalent Length of pipe (75’ x 150%)

75 ÷ 100 x 1.5 (5.0 is the Table 2 pressure drop for 100’ of pipe @ 7.2 GPM)
= .75* x 5.0 = 3.75 feet of pipe pressure drop

** Table 2 lists the pressure loss in 100’ of Composite Pipe. You have the equivalent of 75’ of pipe, making it necessary to divide the total equivalent length of pipe by 100 to get the total pressure drop for the installation. (75 ÷ 100) = .75*

Total pressure drop for Air Handler 2:

Air Handler 2 (3 ton size, Table 4) pressure loss	27.80’ of head
5 ton chiller loss in feet of head (Table 1)	1.85 of head
Pipe pressure loss	3.75’ of head
Total pressure loss for AH 2	33.40’ head

- AH3 (2 ton @ 4.8 GPM)
- 75’ of 3/4” Composite pipe
- 38’ (50% allowance for fittings and headers)
- 113’ Total * Equivalent Length of pipe (75 x 150%)

113 ÷ 100 x 2.7 (2.7.0 is the Table 2 pressure drop for 100’ of pipe @ 4.8 GPM)
= 1.13* x 2.7 = 3.05 feet of pipe pressure drop

** Table 2 lists the pressure loss in 100’ of Composite Pipe. You have the equivalent of 113’ of pipe, making it necessary to divide the total equivalent length of pipe by 100 to get the total pressure drop for the installation. (113 ÷ 100) = 1.13.*

Total pressure drop for Air Handler 3:

Air Handler 3 (2 ton size, Table 4) pressure loss	16.25’ of head
5 ton chiller loss in feet of head (Table 1)	1.85’ of head
Pipe pressure loss	3.05’ of head
Total pressure loss for AH 3	21.15’ head

- AH4 (2 ton @ 4.8 GPM)
- 140’ of 3/4” Composite pipe
- 70’ (50% allowance for fittings and headers)
- 210’ Total * Equivalent Length of pipe (140 x 150%)

210 ÷ 100 x 2.7 (2.7 is the Table 2 pressure drop for 100’ of pipe)
= 2.1* x 2.7 = 5.67 feet of pipe pressure drop

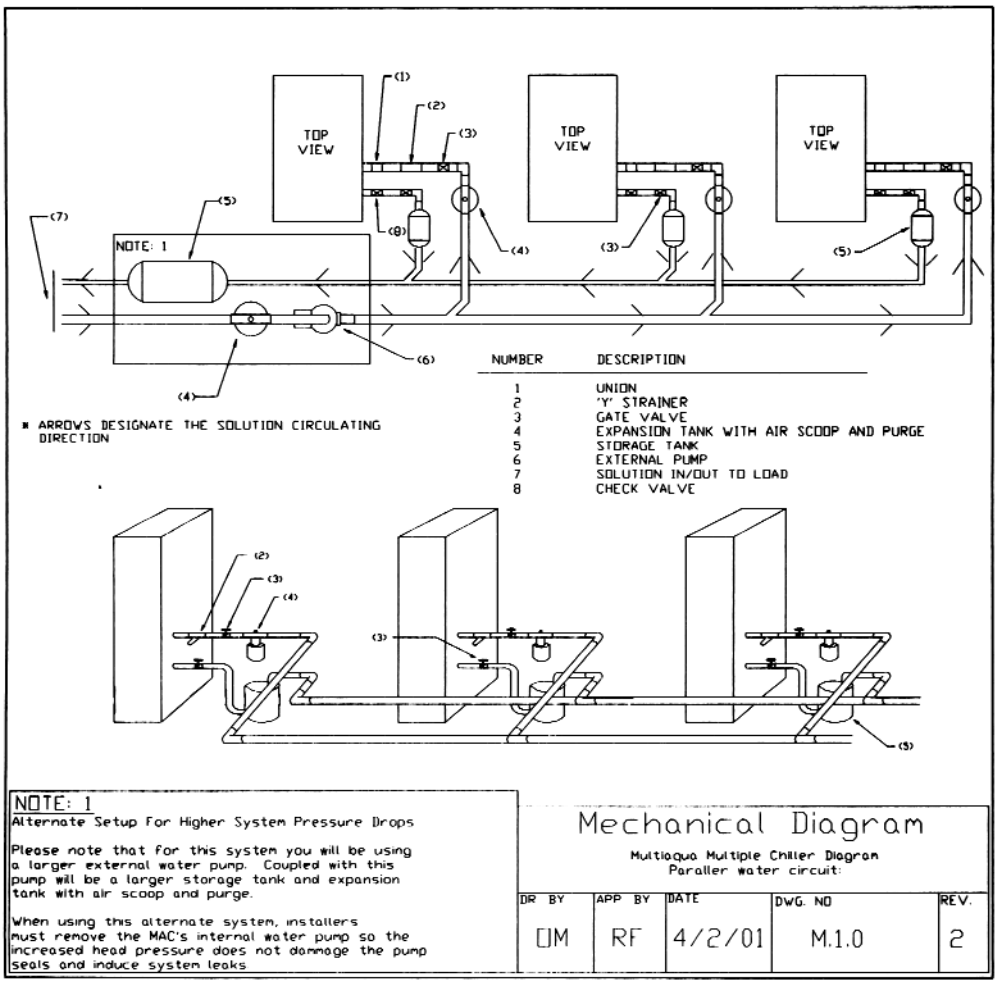
** Table 2 lists the pressure loss in 100’ of Composite Pipe. You have the equivalent of 210’ of pipe, making it necessary to divide the total equivalent length of pipe by 100 to get the total pressure drop for the installation. (210 ÷ 100) = 2.1.*

Total pressure drop for Air Handler4:

Air Handler 3 (2 ton size, Table 4) pressure loss	16.25’ of head
5 ton chiller loss in feet of head (Table 1)	1.85’ of head
Pipe pressure loss	5.67’ of head
Total pressure loss for AH 4	23.77’ head

After comparing the pressure drops from all 4-air handlers (1-4), air handler 2 has the greatest pressure drop, (33.40 ft./head). It is essential to determine which liquid solution circuit has the greatest pressure drop. Each liquid solution circuit should have less calculated head than the pumps rated head.

Banked Chiller Configuration


TOP VIEW
TOP VIEW
TOP VIEW
NOTE: 1
* ARROWS DESIGNATE THE SOLUTION CIRCULATING DIRECTION
NUMBER DESCRIPTION
1 UNION
2 'Y' STRAINER
3 GATE VALVE
4 EXPANSION TANK WITH AIR SCOOP AND PURGE
5 STORAGE TANK
6 EXTERNAL PUMP
7 SOLUTION IN/OUT TO LOAD
8 CHECK VALVE
NOTE: 1
Alternate Setup For Higher System Pressure Drops
Please note that for this system you will be using a larger external water pump. Coupled with this pump will be a larger storage tank and expansion tank with air scoop and purge.
When using this alternate system, installers must remove the MAC's internal water pump so the increased head pressure does not damage the pump seals and induce system leaks
Mechanical Diagram
Multiaqua Multiple Chiller Diagram
Paraller water circuit:
DR BY DM
APP BY RF
DATE 4/2/01
DWG. NO M.1.0
REV. 2

Please refer to page 8 for clearances.

Installation Notes:

⚠ Alternative piping such as steel, or copper, can be used with the Multiaqua system. PVC and CPVC must be avoided, as the presence of propylene glycol will destroy those plastics. Pressure drop data for the selected piping material is readily available and should be used and referred to as in the preceding examples. We recommend the Composite piping system in new construction and remodeling, for it's ease of installation, low-pressure drop, and flexibility. Composite piping specifications and installation data is available from Kitec™ Composite Pipe, (www.Kitec.com). Should a Multiaqua chiller be installed with an existing steel (ferrous metal) piping system, dielectric fittings must be used at the chiller and air handler. The factory-supplied strainer will capture particles of rust and sediment inherent with steel piping, and should be checked and cleaned after initial start-up and on a regular maintenance schedule during the life of the system.

⚠ Any pipe used to conduct liquid solution must be insulated in accordance with local and national mechanical codes. Information on insulation installation and application can be obtained from Armaflex web site at www.armaflex.com, and Owens-Corning site at www.owenscorning.com/mechanical/pipe/.

For future servicing of the chiller and air handlers it is suggested that shutoff valves be installed at the chiller and air handler/s. If ball valves are used they can double as balancing valve/s in the supply piping at each air handler. Chiller shutoff valves should be attached at the chiller connections with unions.

Liquid solution connections to air handlers should not be smaller than indicated in Table 4, to insure adequate liquid solution flow.

⚠ The air handlers are to be controlled with electrically operated "slow-opening" solenoid valves, or motorized zone valves as manufactured by Erie controls (www.eriecontrols.com/products/index.htm) a remote thermostat, or air handler installed, digital control, operate the valves.

⚠ Bypass valves as shown Drawings 1 and 2 should be installed between the supply and return chilled liquid solution supply pipes, at a convenient location to the installation. The bypass valves operate to bypass liquid solution between the supply and return chilled liquid solution lines. In the event air handler valves should shut down, the bypass valve is set to open up and bypass liquid solution between the supply and return lines, relieving pressure, and eliminating the possibility of pump cavitation. To adjust the valve, run the system with one air handler solenoid actuated. De-energize the solenoid valve, (at this point no liquid solution will be flowing through the air handlers), and adjust the bypass valve to relieve pressure between the supply and return piping.

⚠ Bleed ports will be factory installed on all Multiaqua air handlers. Bleed ports are opened to eliminate air trapped in the air handlers after filling the system with liquid solution and Propylene Glycol, and before operating the refrigerant compressor in the chiller.

⚠ The minimum liquid solution content in the chiller system (piping, chiller, and air handlers) is 25 U.S. gallons (refer to Table 1). Table 5 is used to estimate the system liquid solution content. Should the system have less than 25 gallons of liquid solution content, a chilled liquid solution storage tank should be installed. The tank stores enough chilled liquid solution to prevent frequent chiller compressor cycles at light load, and prevents chilled liquid solution temperature swings at higher load conditions when the chiller compressor is waiting to cycle on the time delay control.

⚠ Propylene Glycol must be added to the water used in the system. Propylene helps prevent freeze-ups, due to low ambient temperature conditions, and low chilled liquid solution temperatures. In comparison to water Propylene Glycol slightly lessens the temperature exchange in the chiller heat exchanger*, however that is offset by the increased flow of liquid solution through the piping system*, enabled by the Propylene Glycol. To determine the Propylene Glycol content for various ambient temperatures refer to Table 6.

⚠ In no instance should a Multiaqua chiller be installed with less than 10% Propylene Glycol content in the piping system. Using less than the recommended propylene glycol percentage content voids equipment warranty.

Ethylene Glycol is environmentally hazardous and not recommended. Inhibited Propylene Glycol (typical automotive coolant) is not to be used in a Multiaqua chiller under any circumstances. Dow Chemical's "Ambitrol" family of Glycol-based coolants or food grade Propylene Glycol is suggested. Information on Ambitrol is available from Dow at www.dow.com, search word "Ambitrol".

** See Table 6*

Liquid solution Capacity of Composite Pipe, Multiaqua Chillers, and Air Handlers

Table 5

Pipe Size	Liquid solution Content U.S. Gal./ft.
1/2"	0.009
3/4"	0.016
1"	0.03

Chiller Size	Liquid solution Content U.S. Gal.
MAC-036	1
MAC-048	1

Air Handler Size	Liquid solution Content U.S. Gal./ft.
.5 ton	.3
1 ton	.4
1.5 ton	0.5
2 ton	0.6
3 ton	0.8
4 ton	0.9
5 ton	1

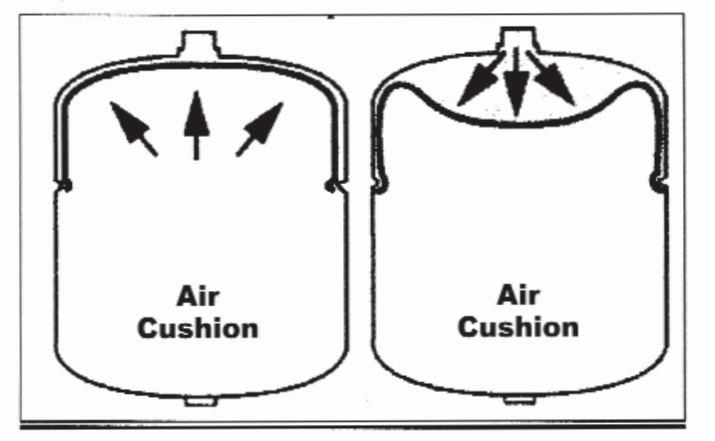
Polypropylene Glycol System Content vs. Minimum Ambient Temperature

⚠ To not engage in cold ambient mitigation will result in the failure of components, property damage, and void Warranty

Table 6

% Of Propylene Glycol to Water Content			
Minimum Ambient Temperature	Propylene Glycol %	Capacity	GPM Adjustment = 100% Capacity
26	10%	X 0.99	X 1.01
18	20%	X 0.98	X 1.03
8	30%	X 0.98	X 1.07
-7	40%	X 0.97	X 1.11
-29	50%	X 0.96	X 1.16

Expansion tanks:



⚠ Liquid solution expansion and contraction within the closed system must be compensated for with an expansion tank. The expansion tank used with the Multiaqua system is a steel tank with a rubber bladder attached to it internally. There is air pressure on one side of the rubber bladder that keeps the bladder pushed against the sides of the tank before the system is filled with liquid solution (illustration on left). As the system is filled, liquid solution pressure pushes the bladder away from the sides of the tank (illustration on right). As the liquid solution heats up the bladder will be pushed further away from the tank walls allowing for expansion, and contraction as the liquid solution temperature changes. By flexing, the bladder controls the system pressure adjusting to temperature variations of the chilled liquid solution system.

⚠ It is critical that the expansion tank air bladder, air pressure be less than the system liquid solution pressure. Air pressure can be measured with an automotive tire gauge, at the bicycle valve port on the expansion tank. Bleeding air out of the bladder, or increasing the pressure with a bicycle pump will adjust pressure.

⚠ System must use a liquid solution storage tank if system volume is less than 25 U.S. Gallons (see Table 1).

Determining Propylene Glycol and System Liquid solution Content

Before the piping system is filled with a liquid solution/ Propylene Glycol solution, the system liquid solution capacity must be determined as follows:

System Description:

- 4 ton (MAC-048) Chiller
- 315’ of installed Main Loop Piping System*, 1” Composite pipe
- 3 two ton air handlers (refer to Table 4)
- 40’ 3/4” Composite™ pipe connecting air handlers to pipe main
- 1 gallon of liquid stored in expansion tank

System Liquid solution Content Calculation

1.3 U.S. Gal.	Chiller Liquid solution Content	from Table 1
12.6 U.S. Gal.	315' of pipe X .04 U.S. Gal./ft.	from Table 2
2.4 U.S. Gal.	3 air handlers X .6 Gal. Each	from Table 5
.64 U.S. Gal.	40' of 3/4" composite pipe	from Table 5
1.0 U.S. Gal.	Stored in expansion tank*	
17.3 U.S. Gal.	Total System Liquid solution Content	

*As a rule of thumb figure that the 2-gallon expansion tank will normally hold 1 U.S. Gal. after system is filled.

Our calculation determined that the liquid solution capacity of the piping system was only 17.3 U.S. Gal., which is below the system requirement of 25 U.S. Gal. A storage tank is called for this system.

System Liquid solution Content with Storage Tank

17.94 U.S. Gal.	Originally calculated system liquid solution content
20.0 U.S. Gal.	Liquid solution Storage Tank Capacity
37.94 U.S. Gal.	Total System Liquid solution Content

Calculating Polypropylene Glycol Content

37.94 U.S. Gal.	Total System Liquid solution Content
7.59 U.S. Gal.	20% Propylene Glycol Content for 18ºF Minimum ambient temperature*

**Refer to Table 6*

In the above example the system will hold 37.94 U.S. Gal. of which 7.59 U.S. Gal. must be Propylene Glycol if the minimum expected ambient temperature is 18º F.

7.59 U.S. Gal.	Propylene Glycol Content (20% of system Content)
29.84 U.S. Gal.	System Liquid solution Content

In practical terms you would pump or pour into the system 15 – 16 U.S. Gal. of a 50%/50% mixture of water and Propylene Glycol in system before filling the remainder of the system with water.

Filling System with Liquid solution and Coolant (Propylene Glycol)

⚠ Concentrations of Propylene Glycol in excess of 50% will destroy O rings in fittings, and pump. Water should be added to the system first, or a liquid solution diluted Propylene Glycol mix.

Systems that contain 25 or more U.S. Gallons should have a tee fitting with a stopcock installed in the return line close to the chiller. The stopcock can be opened and attached to a hose with a female X female hose fitting. Into the open end of the hose section (1 – 11/2 feet long), insert a funnel and pour into the system, the diluted Propylene Glycol/liquid solution mixture or add water first and then the quantity of Propylene Glycol needed for minimum ambient protection (refer to Table 6). After adding the propylene glycol/water mixture, or liquid solution and then coolant proceed to add enough water to the system to achieve a 15 psi gauge pressure. To measure system pressure, shut off the stopcock, remove hose and attach a water pressure gauge. Open the stopcock to read system pressure.

Systems that use the Chilled Liquid solution Storage Tank should be filled at the tee/stopcock fitting in the outlet fitting in the outlet fitting of the storage tank. Fill the tank with 10 gallons of water and with a funnel pour the calculated (refer to Table 6), amount of propylene glycol into the tank. The amount of propylene glycol added should be calculated to achieve minimum ambient protection. After adding propylene glycol fill the system with enough liquid solution to bring system pressure to approximately 15 psi gauge pressure. To measure system pressure, shut off the stopcock and attach a water pressure gauge. Open the stopcock to read system pressure.

Air Elimination

Since we have the system filled we must eliminate the air left in the system. Briefly open each bleed valve at the air handlers, and allow trapped air to escape. This will eliminate much of the air left in the system.

Next we will start the pump and continue bleeding air from the system. Be sure the chiller has line voltage available to it, and set the chilled liquid solution control up to 100º F, which will insure that only the pump runs at this point. The pump should now start and remain running. Should the pump stop at any time during this process it is an indication that the flow switch had air move past it allowing the circuit to be interrupted. Continue to bleed some more air out of the system at the highest locations before resetting the pump bypass timer to get the pump running again. Open and close the power supply switch to the chiller to restart the pump. Continue bleeding air with the pump operating. You may have to start and re-start the pump a few times to complete air removal.

⚠ Before filling system with propylene glycol and water, pressure test-piping system with compressed air. Testing should be done at a minimum of 50 psi, but no greater than 50 psi over the systems normal operating pressure. The system should hold air pressure for a minimum of an hour with no leakage.

⚠ All piping systems should have a minimum of 10% propylene glycol in the system even in climates with non-freezing ambient temperatures.

⚠ Using less than the recommended propylene glycol Percentage content voids equipment warranty

⚠ Liquid solution control valves (solenoid or motorized valves) should be selected for low-pressure drop. If a selected valve contributes to pushing your total head calculation to more than 50 feet of head, a larger valve may be needed to bring your total head below the maximum of 50 feet.

Liquid solution Balancing

Liquid solution balancing will require an accurate digital thermometer to measure return line liquid solution temperature at each air handler. Set the chilled liquid solution temperature control in the chiller at a normal operational temperature (44ºF), and measure pump discharge temperature with the digital thermometer to check system liquid solution temperature. After the chilled liquid solution temperature has lowered to the set point begin the balancing process. The system must be free of air, and each air handler set at a temperature low enough to continue cooling operation (and liquid solution flow) during the balancing process. Begin by measuring the return line chilled liquid solution temperature of each air handler. Begin incrementally closing the supply line balance valve at the air handlers with the lowest return line chilled liquid solution temperature. Continue this process until each air handler has close to the same return line chilled liquid solution temperature.

Multiaqua™

Limited Warranty Information and Registration

This warranty is extended by Multiaqua, Inc. (hereafter referred to as MAI) to the final purchaser. MAI warrants it's products to be free of defects in materials and workmanship at the time of original purchase and for subsequent periods of time as described below.

Multiaqua MAC & MACH Chiller parts are warranted to be free from manufacturing defects for up to 12 months from the date of installation.

- The compressor is warranted for 5 years from the date of installation
- The heat exchanger is warranted for 5 years from the date on installation

Multiaqua CFF, MHW, MCC series **Fan Coil** parts are warranted to be free from manufacturing defects for up to 12 months from date of installation.
Multiaqua Accessories - valves, storage tank, expansion tank, and control are warranted to be free from defects for up to 12 months from the date of original installation.

If, during the period of warranty, the products listed prove defective under normal use and service due to improper materials or workmanship as determined by MAI, the company will at it's sole discretion, repair or replace the defective part or component.

Conditions

- In the event MAI repairs or replaces a part of component, the repaired or replaced product shall be warranted under the original limited warranty for the remainder of the original warranty period
- The warranty does not cover any failure of components not supplied by the MAI, nor does it cover failure of any part due to misuse (including neglect, improper installation, repair alteration, modification, or adjustment).
- Damage caused by freezing, corrosion, and fouling is not covered under this warranty.
- There are no other express warranties, whether written or oral other than this printed limited warranty. All implied warranties, including without limitation the implied warranties or merchantability or fitness for a particular purpose, are limited to the duration of this limited warranty. In no way shall the company be liable for incidental or consequential damages of any nature whatsoever, including but not limited to lost profits or commercial loss, to the full extent those damages can be disclaimed by law.

ISO 9002

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